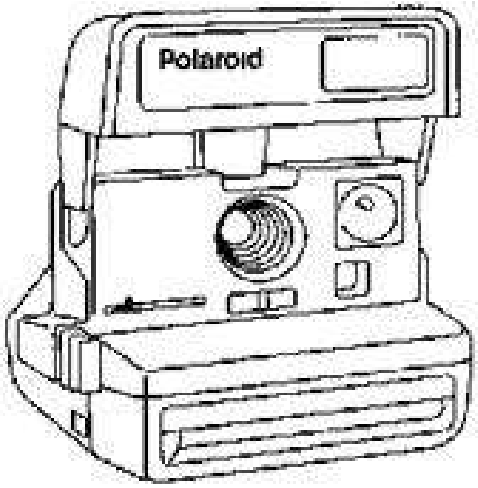
Polaroid

Repair Manual



636/636AF Instant Camera

December 1995

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Model 636 Camera Service Manual

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PARTS CATALOG: Separate document.

See **Polaroid Model 636 CAMERA PARTS CATALOG, January 1994** for part names, numbers and exploded views.

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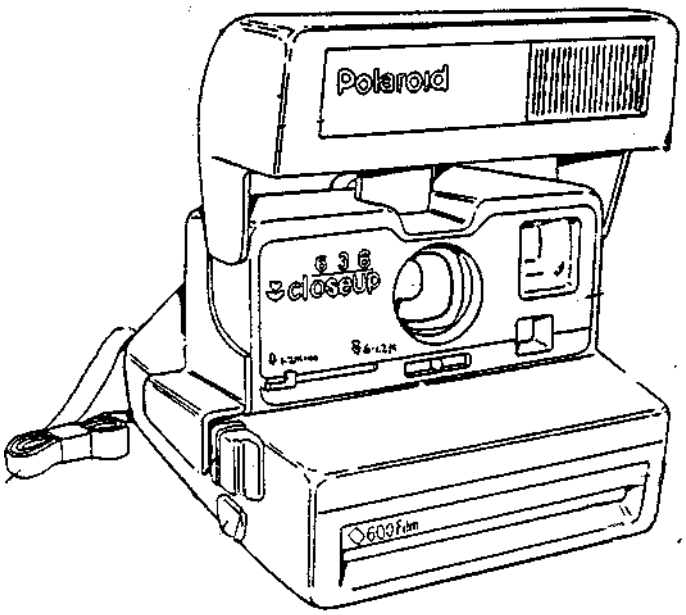
SECTION 1 - MODEL 636 CAMERA GENERAL DESCRIPTION

The Model 636 OneStep/CloseUp Camera is an evolutionary, reliable, low-cost design in the Polaroid "600" family of integral strobe, fixed focus hardbody cameras. It makes extensive use of the 640 Camera technology and has many derivative characteristics of the 630 and 635 Camera designs as well. The 636 offers automatic exposure control, fixed focus and rapid strobe recharge.



Model 636 was introduced in worldwide and U.S. markets in 1992 and 1993, and offers users the following features:

* Close-up lens for subjects 2 - 4 ft. (0.6 - 1.2m) from Camera. An oval frame outline visible in the Viewfinder helps position subject correctly.

* Depth of field 4 ft. (1.2 m) to infinity.

* Built-in, fold down, integral quench SPAR Strobe with 2 to 10-ft.(0.6 to 3.0 m) range, in swing-up housing. Strobe charges automatically in 4 sec. when erected. Green strobe-ready LED in rear of housing; remains ON for about 30 sec.

* Electronic logic for fill-flash in outdoor brightness, in approximate proportions of 75% ambient light and 25% strobe fill.

* Uses 10-picture Polaroid 600 (ASA 600) color film.

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* Non-flash button allows pictures to be taken without strobe firing (e.g., through glass window).

* Lighten/Darken (trim) control for adjusting exposure + or - 3/4 stop. When in L or D position, double arrows are visible in Viewfinder as reminder to user.

* Exposure control utilizing both ambient and IR light measurement. Flash exposure control via IR quench full dissipation SPAR strobe.

* Picture counter shows number of exposures remaining (counts down).

* "Talking Camera" version plays pre-recorded message just before shutter opening, to encourage subjects to smile.

* Adjustable neck strap and on some models, tripod socket.

SPECIAL NOTE: 636 AF AUTOFOCUS CAMERA:

Model 636 AF Autofocus Camera, from a service standpoint, is similar to the 636 OneStep/Close Up **only in outward appearance.**

As an extension of the 636 Camera line, the 636 AF uses a slightly modified version of the Impulse shutter and a repackaged version of the Joshua electronics and software. It uses wink autofocus from two feet to infinity, a rapid recharge strobe with a range of 10 feet, and has a maximum shutter aperture of f/12.

In addition to more than two dozen unique parts, the 636 AF camera uses a combination of parts from the 636, the Impulse Shutter and Joshua electronics.

* * * * * *

For more information, please refer to:

NPI 600AM #95-44, dated March 27, 1995

636 AF CAMERA CUSTOMER SERVICE INFORMATION MANUAL
MARCH 1995

MODEL 636 AUTOFOCUS CAMERA PARTS CATALOG
MARCH 1995

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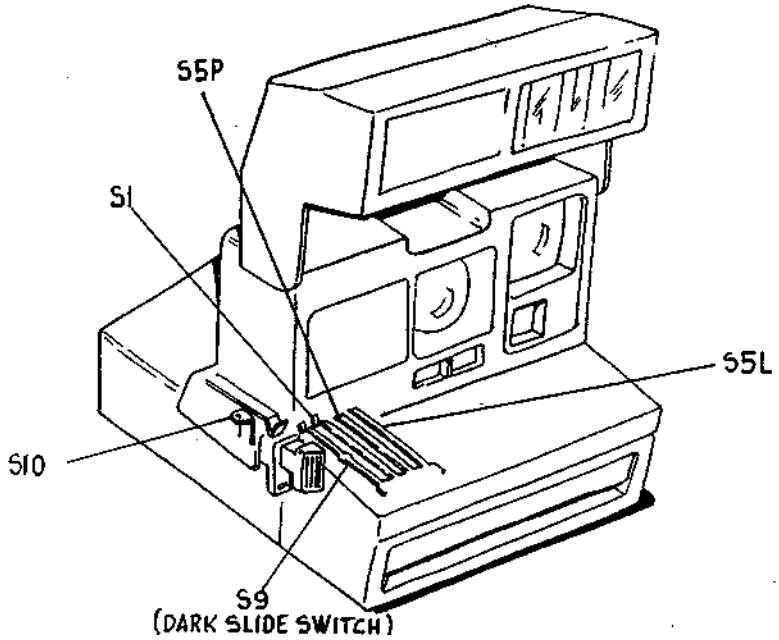
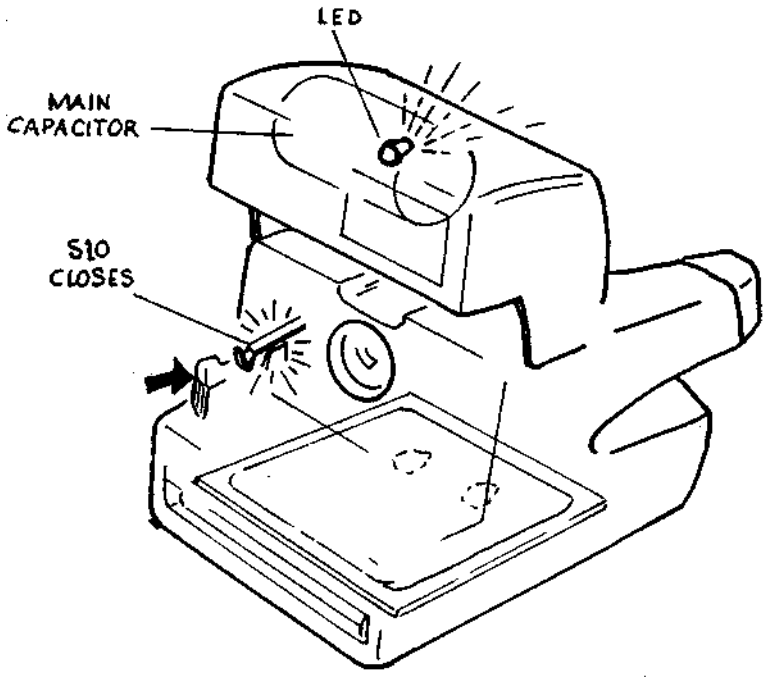
SECTION 2 - MODEL 636 SEQUENCE OF OPERATION



1. Shown here is the location of the switches which regulate flash charging, flash fire and exposure. We will now run through a flash exposure sequence.



2. Lightly pressing the exposure button closes the S10 contacts, charging the strobe main capacitor.

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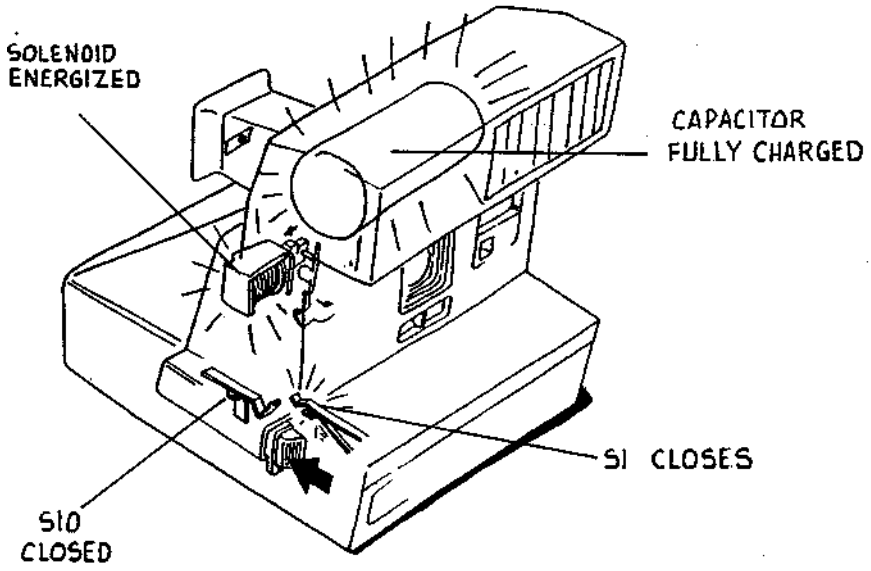
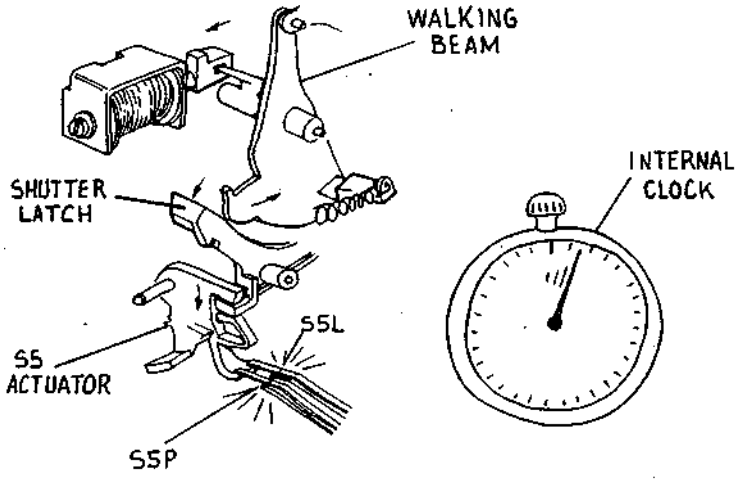


3. Within five seconds the green LED at the rear of the strobe comes on, indicating that the main capacitor is fully charged. The picture taker may now press in the exposure button fully. This closes S1 and S10 remains closed. Closing S1 energizes the solenoid which pulls in slightly.



4. As the solenoid pulls in, it releases the walking beam from the shutter latch. The spring-loaded S5 actuator drops down, closing the S5P and S5L contacts. S5L starts an internal clock. The camera electronics signal the solenoid to deenergize.

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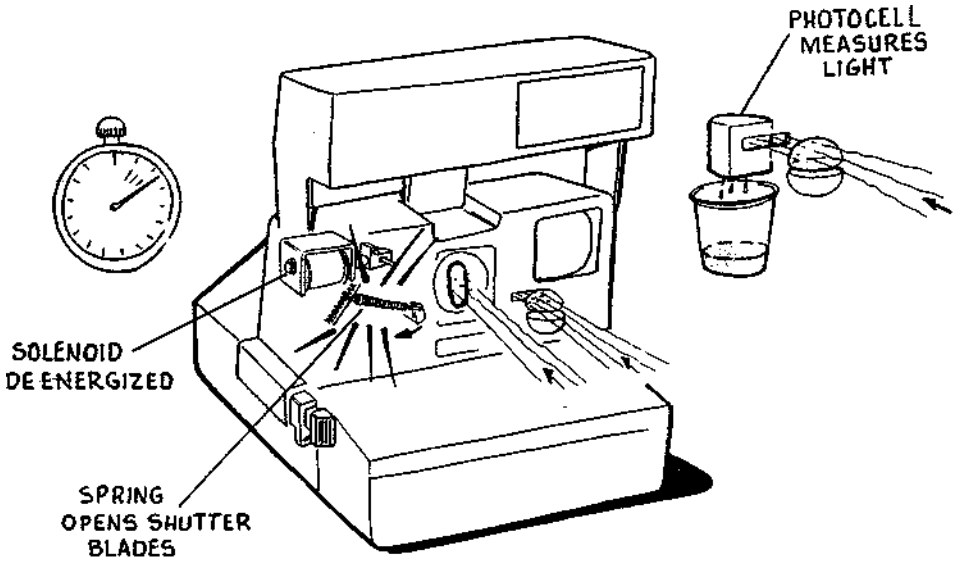
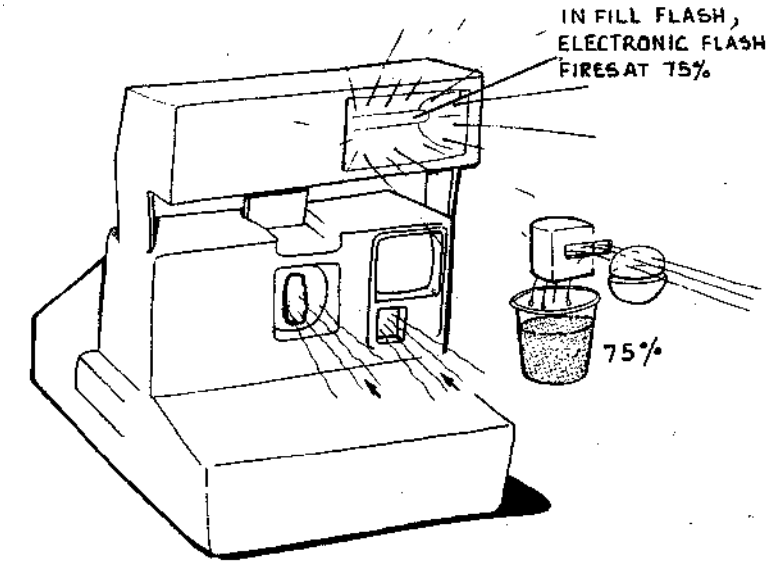


5. With the solenoid deenergized and the walking beam free of the shutter latch, spring-action opens the shutter blades. The internal clock is running and the photocell starts to measure light.



6. In a fill-flash exposure, when the photocell sees 75% of the light needed for a proper exposure, it signals the flash to fire. The flash provides the remaining 25% of the necessary light. Note that in a fill-flash exposure, the photocell always beats the internal clock in ordering flash fire.

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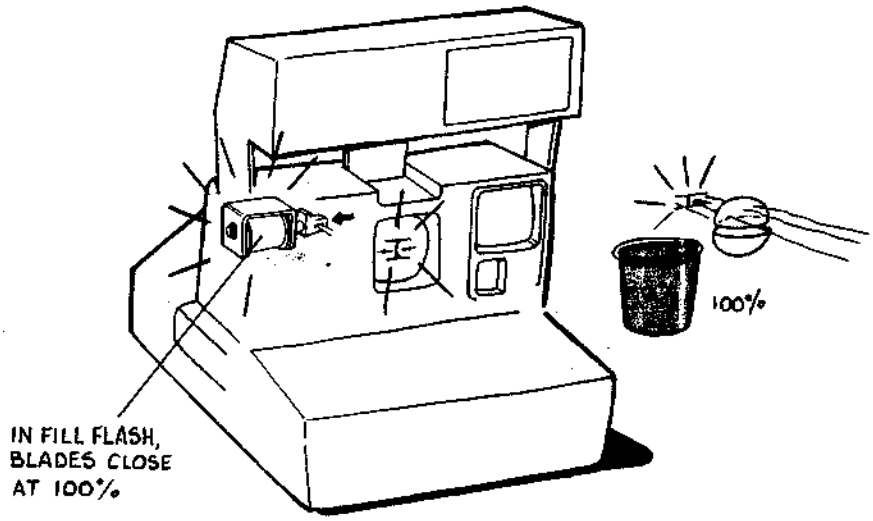
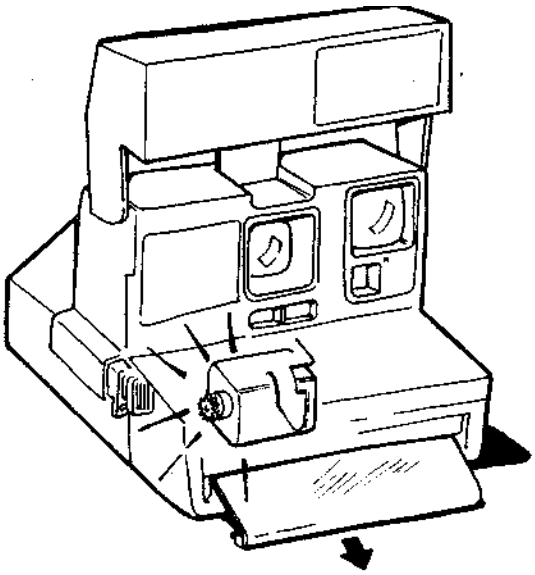


7. When the photocell sees 100% of the light needed for the exposure, the camera electronics orders the flash to quench and the solenoid to energize. The solenoid then pulls the blades closed.



8. After the blades close, the motor is turned on, activating a gear drive system similar to the system in the OneStep. The timing gear:

   advances the pick
   indexes the counter
   brings the S5 actuator back to its original position.

   The solenoid deenergizes and the shutter system is again latched closed, ending the fill-flash sequence.

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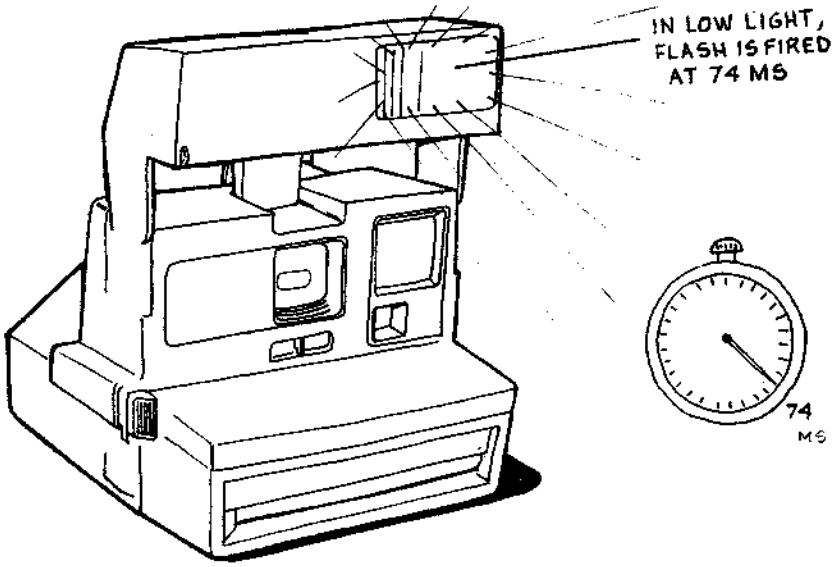
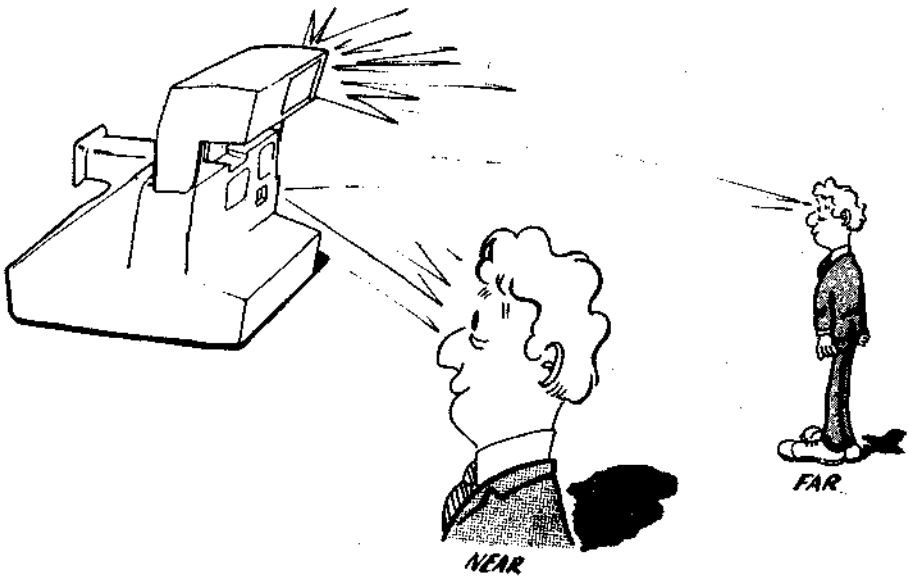


9. The sequence for low-ambient conditions begins identically to the fill-flash sequence. The flash is charged via S10 and the shutter blades open the same way. However, the flash is fired by the internal clock reaching 74 ms, rather than by the photocell light measurement. This happens because there is relatively little light passing through to the photocell.



10. Next, the camera logic asks whether the subject is NEAR or FAR. This information is needed to properly set the electronics for low ambient pictures.

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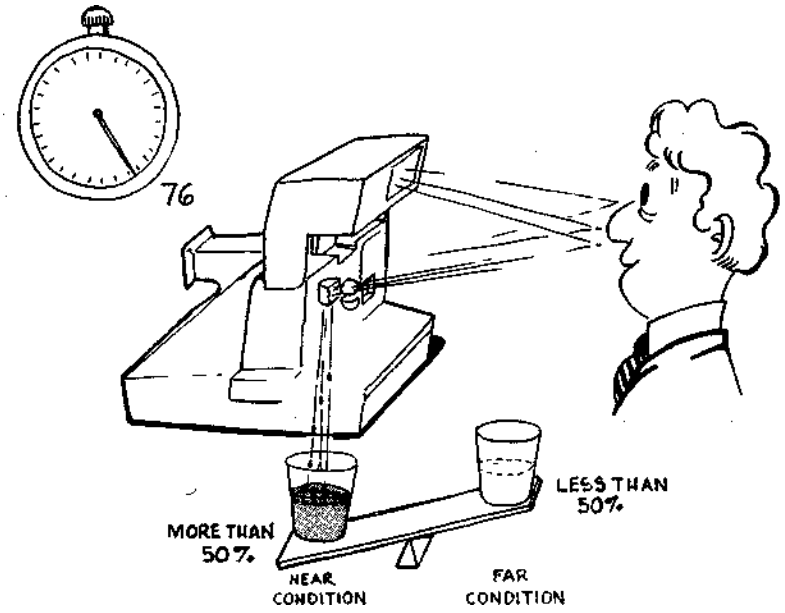
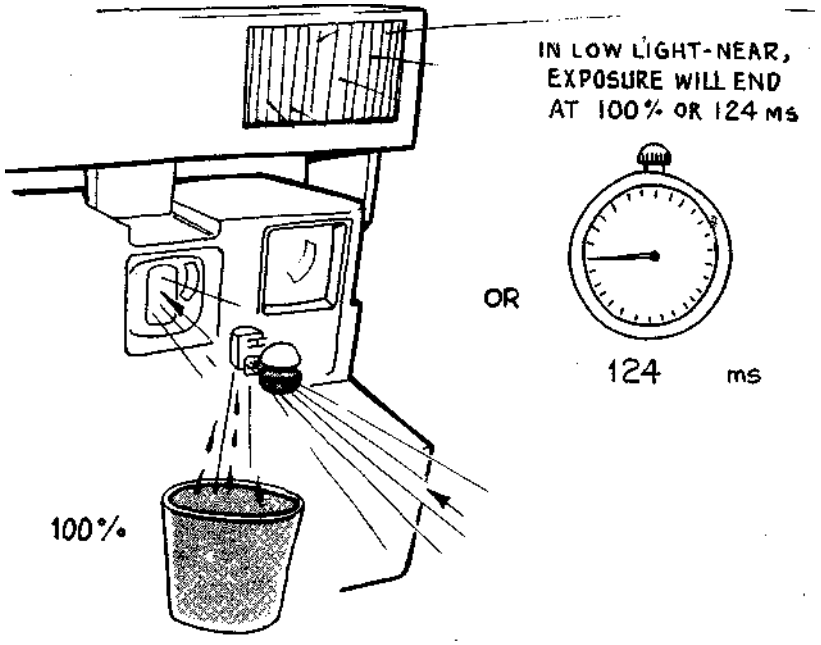


11. The camera determines whether the subject is NEAR or FAR by measuring the amount of light reflected back to the photocell 2 milliseconds after the flash has fired (76 ms into the exposure sequence). If the measurement is more than 50% of the total needed for a proper exposure, the camera decides the subject is NEAR. If the subject is NEAR, the electronics sets the clock to time-out at 124 ms.



12. In a low-light NEAR picture, the blades open partially so that the photocell is measuring infrared light through the infrared filter. The flash is quenched and the shutter blades closed either when the photocell sees 100% of the light needed for a proper exposure or when the internal clock reaches 124 ms.

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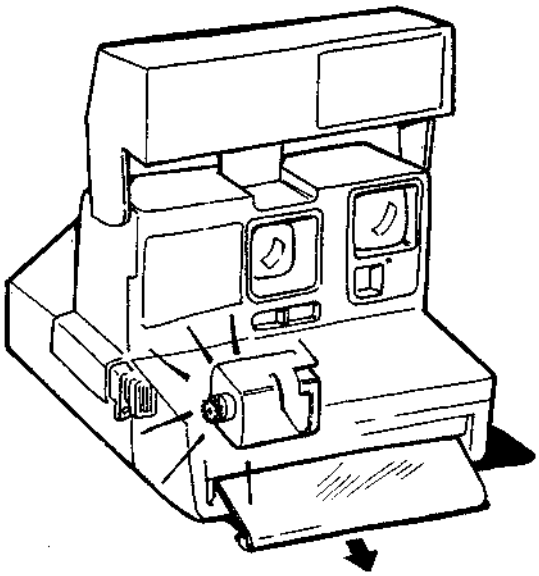
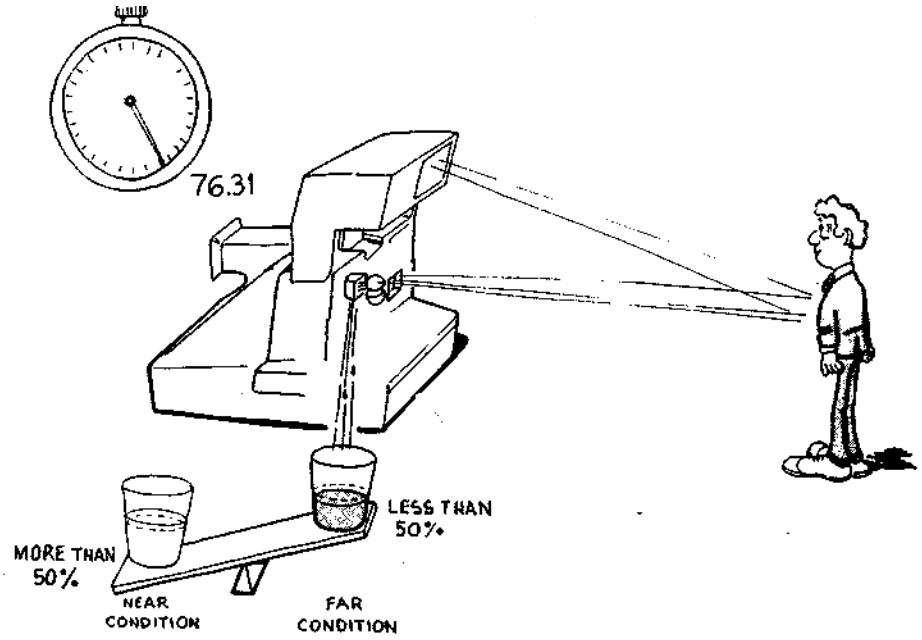


13. After the blades close, the motor is turned on. The timing gear advances the pick, indexes the counter, and brings the S5 actuator back to its original position. The shutter system is latched closed, ending the low ambient NEAR sequence.



14. If the light measured 2 milliseconds after the flash has fired is less than 50% of the total needed for a proper exposure, the camera decides the subject is FAR.

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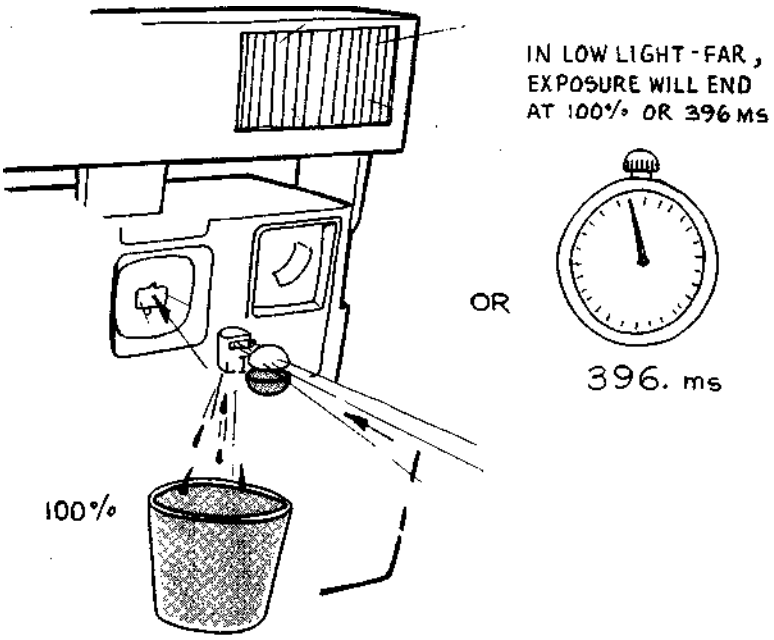
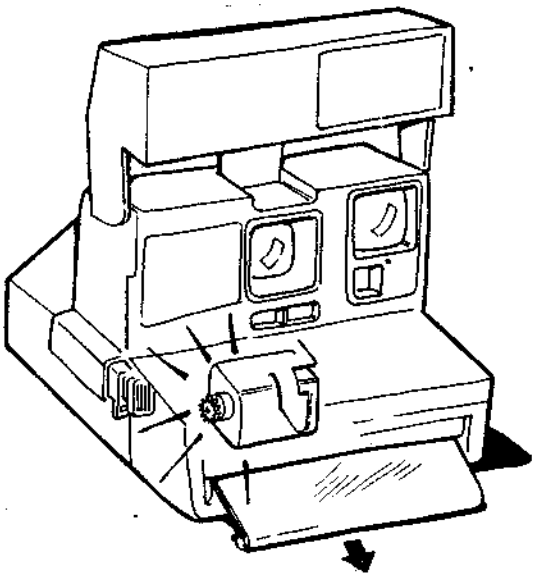


15. In a low-light FAR picture, the blades open fully and the photocell sees scene light through the photopic filter. When 100% of the necessary light is seen or when the internal clock reaches 396 ms, the flash is quenched and the shutter blades close.



16. After the blades close, the motor is turned on. The timing gear advances the pick, indexes the counter, and brings the S5 actuator back to its original position. The shutter system is latched closed, ending the low-ambient FAR sequence.

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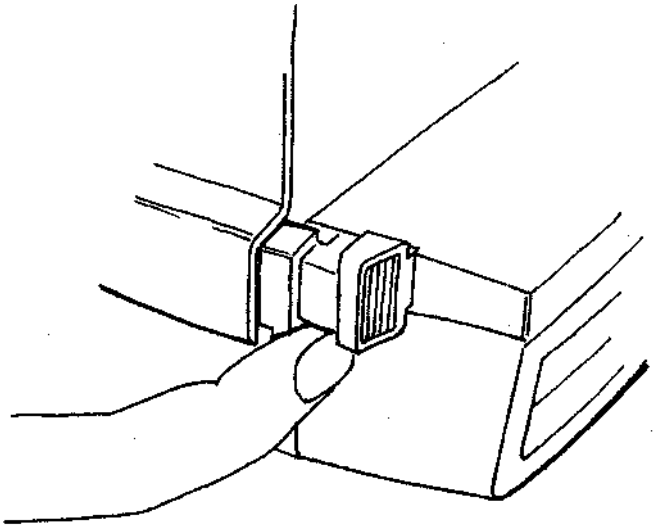

17. For a non-flash picture (through a window), the exposure is started by pressing S1 only. The end-exposure command is given either when the photocell sees 100% of the necessary light for a proper exposure or when the internal clock reaches 396 ms.

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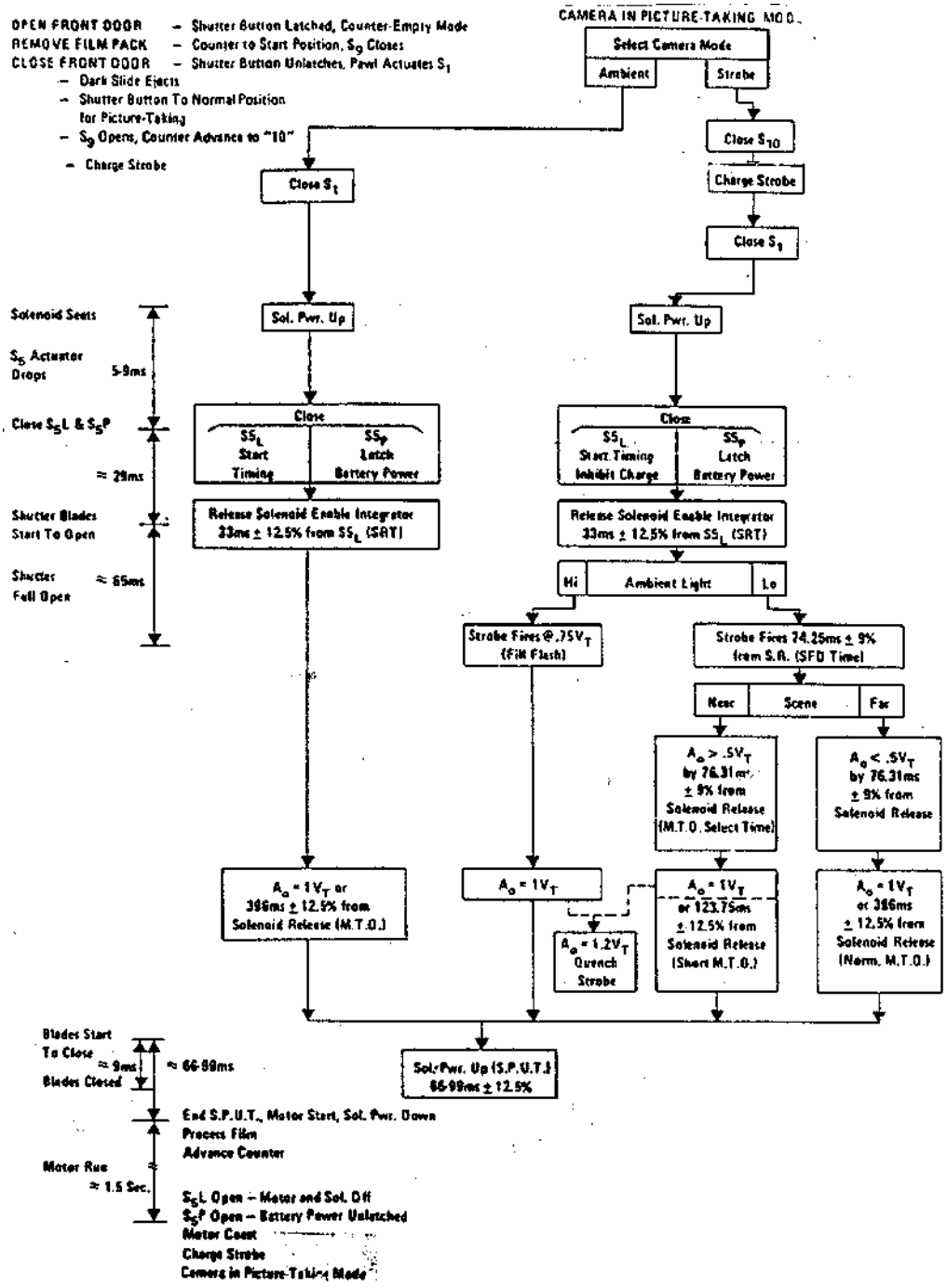
Camera Operating/Exposure Sequence Diagram


OPEN FRONT DOOR – Shutter Button Latched, Counter-Empty Mode
REMOVE FILM PACK – Counter to Start Position, S_9 Closes
CLOSE FRONT DOOR – Shutter Button Unlatches, Pawl Actuates S_1
– Dark Slide Ejects
– Shutter Button To Normal Position for Picture-Taking
– S_9 Opens, Counter Advance to "10"
– Charge Strobe
CAMERA IN PICTURE-TAKING MODE
Select Camera Mode
Ambient
Strobe
Close S_{10}
Charge Strobe
Close S_1
Close S_1
Sol. Pwr. Up
Sol. Pwr. Up
Solenoid Seats
S_5 Actuator Drops
5-9ms
Close S_5L & S_5P
≈ 29ms
Shutter Blades Start To Open
Shutter Full Open
≈ 65ms
Close
SS_L Start Timing
SS_P Latch Battery Power
Close
SS_L Start Timing Inhibit Charge
SS_P Latch Battery Power
Release Solenoid Enable Integrator 33ms ± 12.5% from SS_L (SAT)
Release Solenoid Enable Integrator 33ms ± 12.5% from SS_L (SRT)
Hi
Ambient Light
Lo
Strobe Fires @ .75V_T (Fill Flash)
Strobe Fires 74.25ms ± 9% from S.R. (SFD Time)
Near
Scene
Far
$A_o > .5V_T$ by 76.31ms ± 9% from Solenoid Release (M.T.O. Select Time)
$A_o < .5V_T$ by 76.31ms ± 9% from Solenoid Release
$A_o = 1V_T$ or 386ms ± 12.5% from Solenoid Release (M.T.O.)
$A_o = 1V_T$
$A_o = 1V_T$ or 123.75ms ± 12.5% from Solenoid Release (Short M.T.O.)
$A_o = 1V_T$ or 386ms ± 12.5% from Solenoid Release (Norm. M.T.O.)
$A_o = 1.2V_T$ Quench Strobe
Blades Start To Close
≈ 9ms
Blades Closed
≈ 66-88ms
Sol. Pwr. Up (S.P.U.T.) 66-99ms ± 12.5%
End S.P.U.T., Motor Start, Sol. Pwr. Down
Process Film
Advance Counter
Motor Run
≈ 1.5 Sec.
S_5L Open – Motor and Sol. Off
S_5P Open – Battery Power Unlatched
Motor Coast
Charge Strobe
Camera in Picture-Taking Mode

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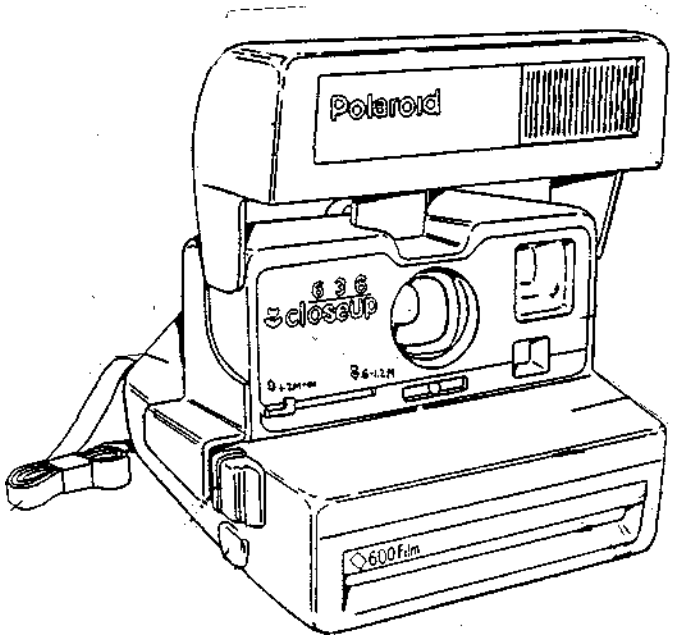
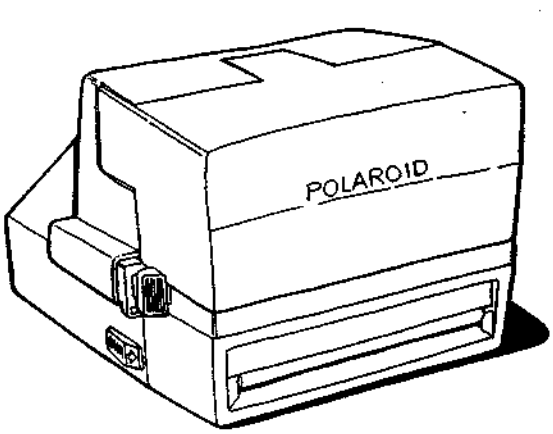
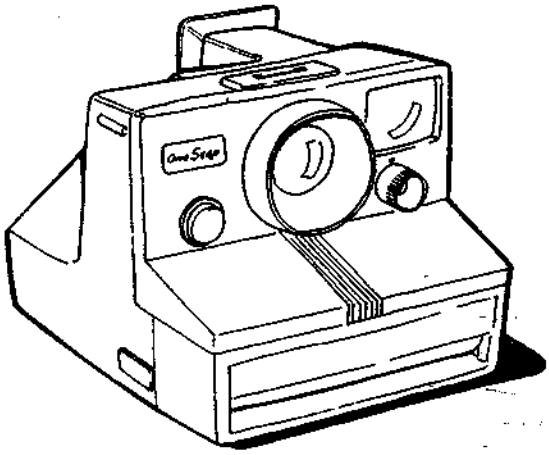
SECTION 3 - MODEL 636 THEORY OF OPERATION



1. This is the Model 636 Camera which is one of a new line of 600 cameras.





2. The Model 636 shares many of the features of the 635 and 640 Cameras. Among these are: Fixed Focus Lens, Electronic Shutter, Film Shade, Lighten/Darken Control, Empty Pack Lockout, Film Counter, Carrying Strap and a Fill Flash Capability.

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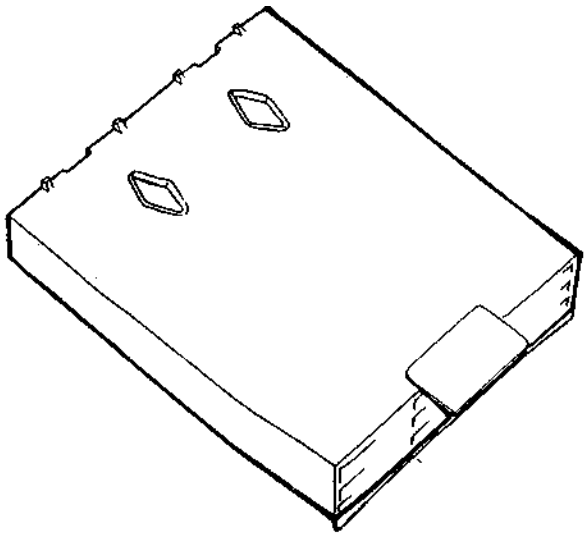
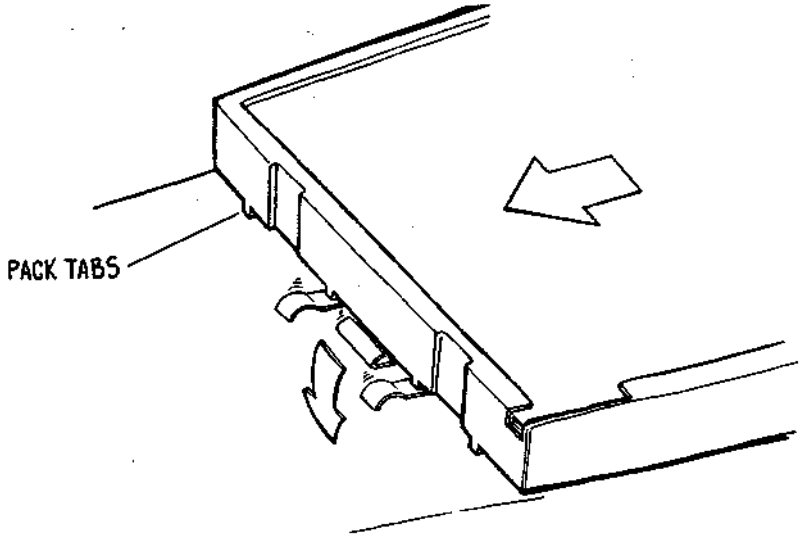


3. One of the major differences between the Model 636 and the OneStep is the type of film it uses. Like all of the 600 line, the 636 uses a new film format. The film has a speed of 6O0 ASA.



4. On the inner edge of the 600 film pack is a set of molded plastic tabs which interface with the pack spring in the camera. The two middle tabs press down the ramps of the pack spring, allowing the film pack to slide over the stop for insertion into the camera. On older style SX-70 packs there are no tabs. As a result, the pack is prevented from being inserted into a 600 line camera by the pack spring stop.

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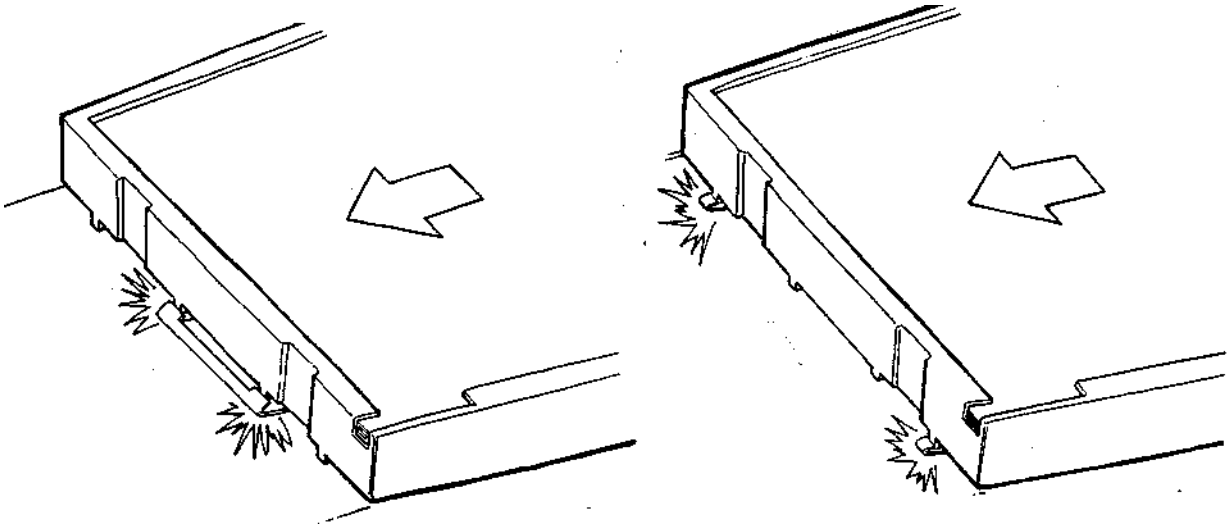

5. On the other hand, a 600 film pack cannot be inserted into an SX-70 style camera since the tabs on the pack are held back by the older style pack springs.

6. The battery in the 600 film pack has a higher capacity than the conventional SX-70 battery. It provides power for the shutter solenoid, the motor and for the built-in electronic flash.

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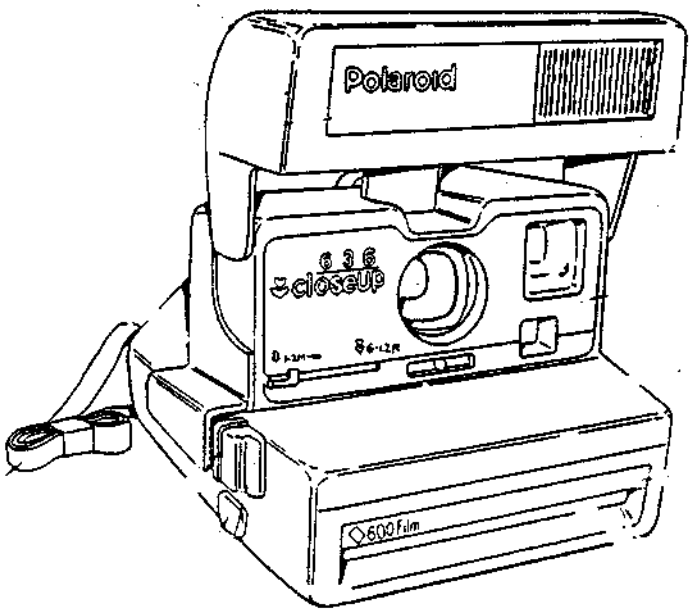
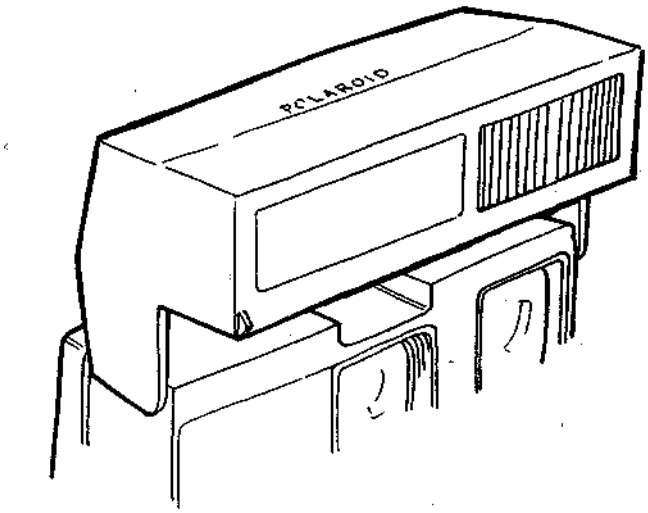


7. When you open the camera, you can see another obvious difference between the Model 636 and the One Step — a built-in electronic flash. The flash is designed to be used for all pictures, both indoors and outdoors.



8. The electronic flash features a rapid charge time of about 5 seconds. For outdoor pictures, the flash is used to provide a proportional fill-flash to eliminate objectionable shadows. Indoors, the flash provides controlled light for scenes within a 4 to 10-foot range.

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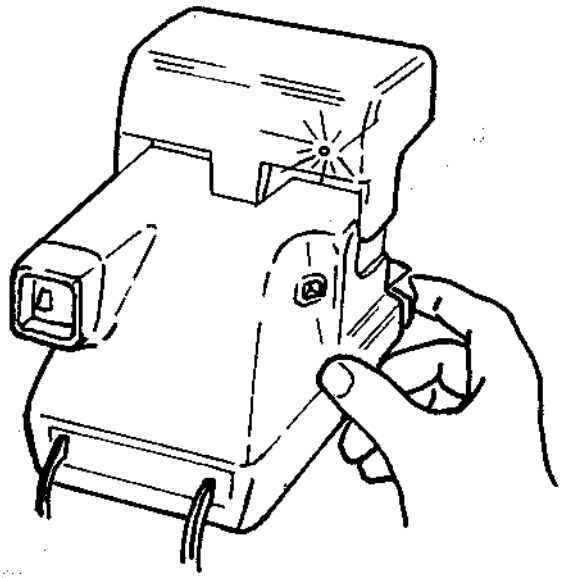
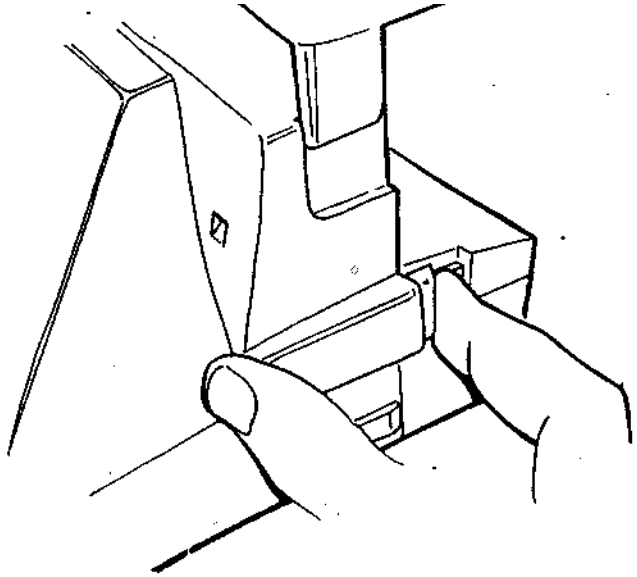


9. The flash is charged by lightly pressing the camera exposure button. The exposure mode is electronically inhibited until the flash is fully charged. When the green LED comes on, a picture can be taken by pressing the exposure button in all the way.



10. An alternate way to charge the flash is to lightly press the exposure button. The button can then be released. After the green LED has come on the flash will stay fully charged for approximately one minute. When the exposure is ready to be made, the exposure button is pressed in fully, in one motion.

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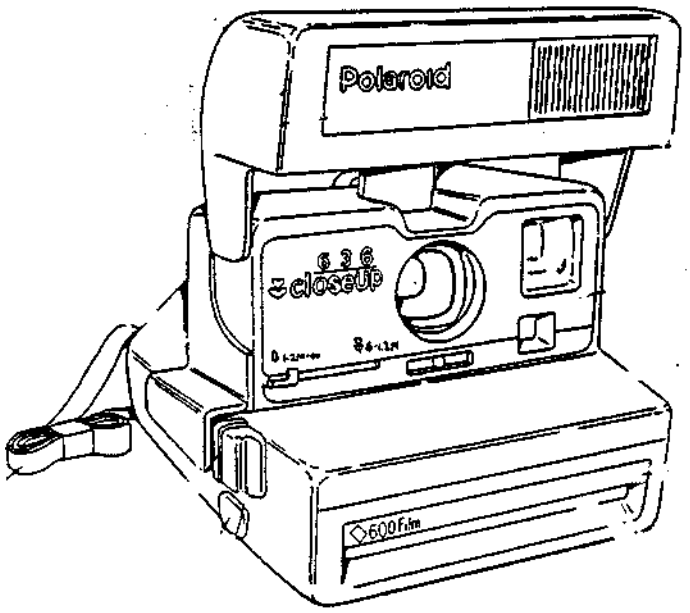
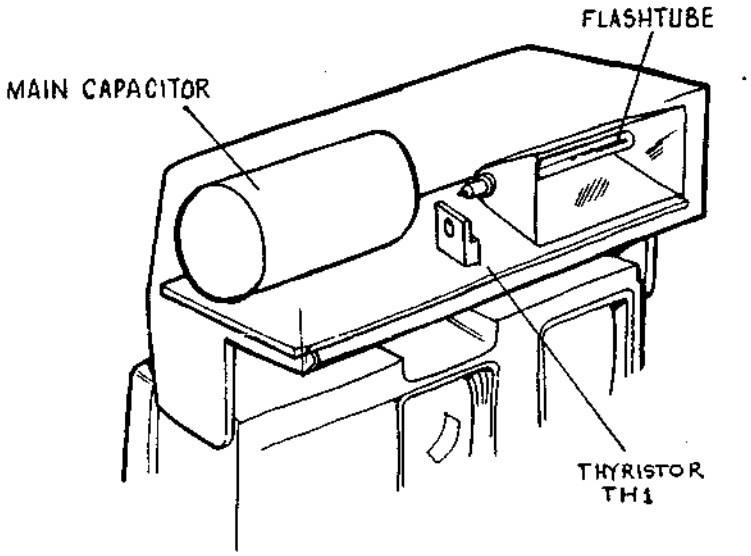


11. The built-in flash is an electronic quench-type flash. It can provide a full output of about 340 zonal-lumen seconds (ZLS) to illuminate a scene or it can be shut down early to provide less light to the scene. The way the camera decides to provide full or partial light output will be discussed later.



12. Whether or not the flash provides full output, the main capacitor delivers the same amount of energy. Therefore, if the flash is ordered to shut down early, some means must be found to dissipate the remaining energy in the circuit. This remaining energy is diverted through a thyristor (TH1) on the strobe board.

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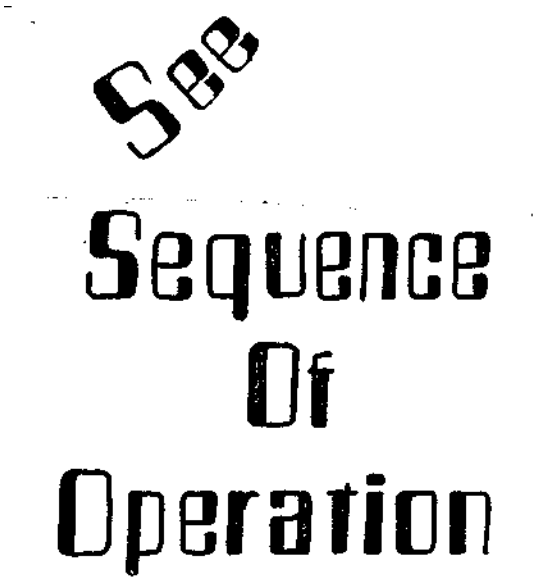
13. Now, let's talk about the way the camera logic decides when to fire the flash and how much light it needs from the flash before it quenches it.



14. Refer to the Sequence of Operation section for a description of the order in which all of the events in an exposure cycle occur. (The operating sequence is also shown in diagram form, at the end of Section 2.)

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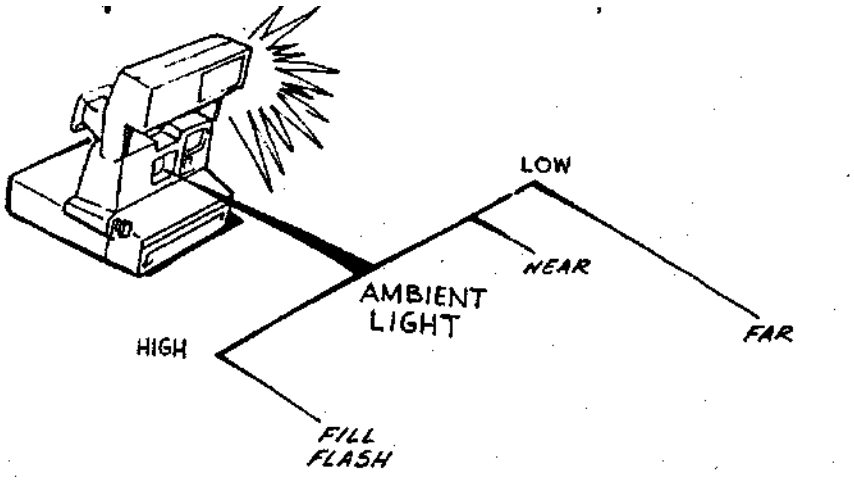
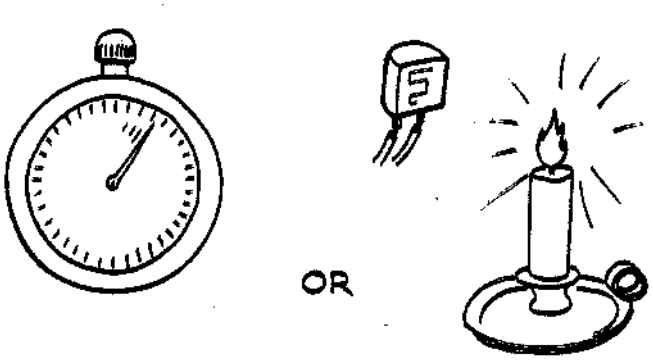


15. There are three different conditions in which a flash picture can be taken:

1 - In high ambient light.
2 - In low ambient light with the subject near the camera.
3 - In low ambient light with the subject far from the camera.



16. Basically, the Model 636 uses either a light measurement alone to fire and shut down the flash, or a combination of light measurement and time measurement to fire and shut down the flash. The method used depends upon scene brightness.

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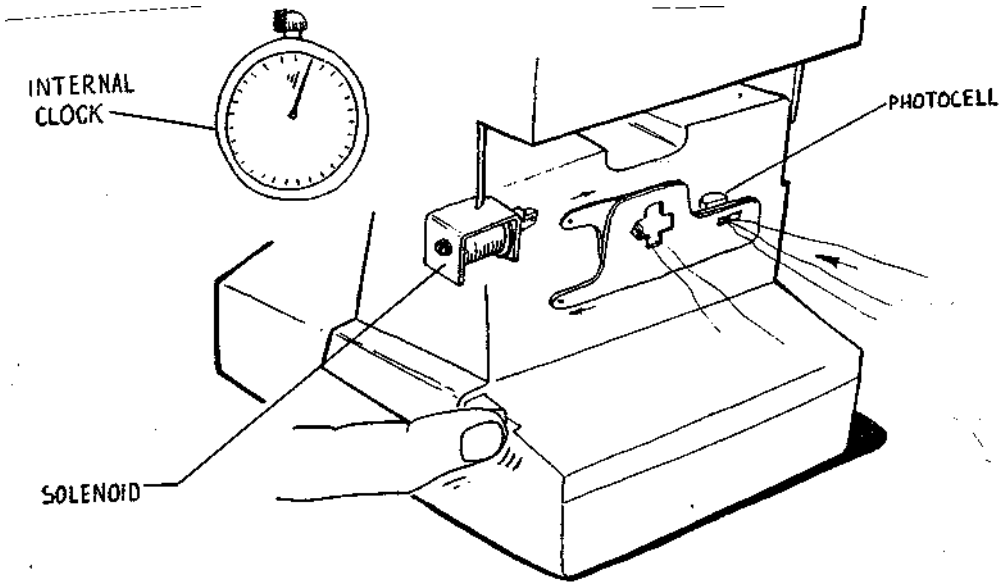
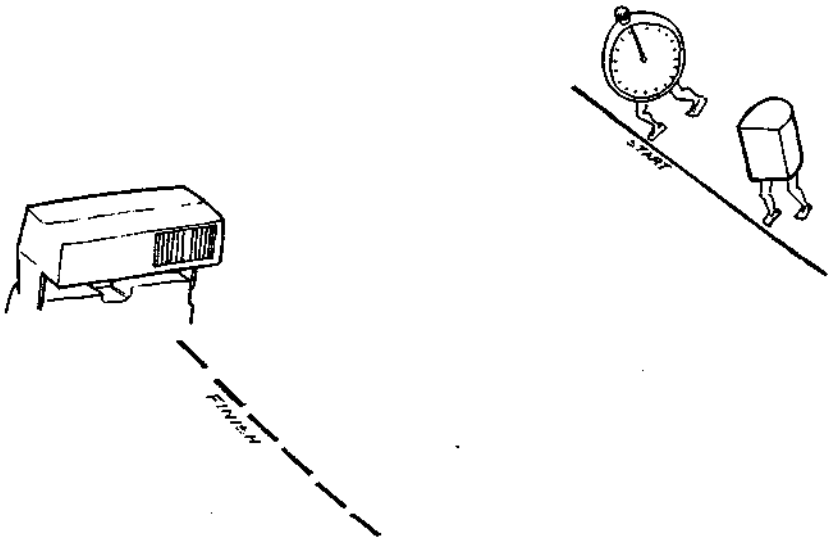


17. After the flash is charged and the exposure button is pressed all the way in, three things happen simultaneously which decide how the flash is going to be controlled:

1 - The solenoid releases the shutter blades and they start to open;
2 - The photocell starts to measure scene light;
3 - An internal clock in the camera logic is started.



18. From this point, there is a race between the internal clock and the photocell to decide which is going to control the flash. Either the internal clock will time-out before the photocell measures a pre-determined amount of light or vice versa. Whichever occurs first will fire the flash.

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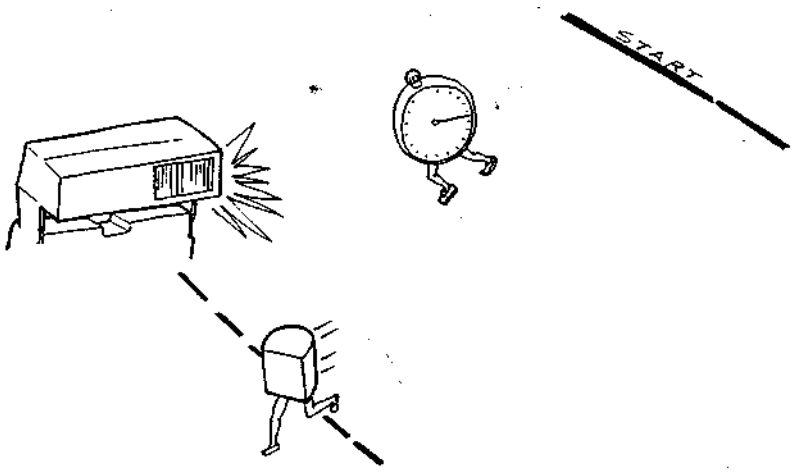
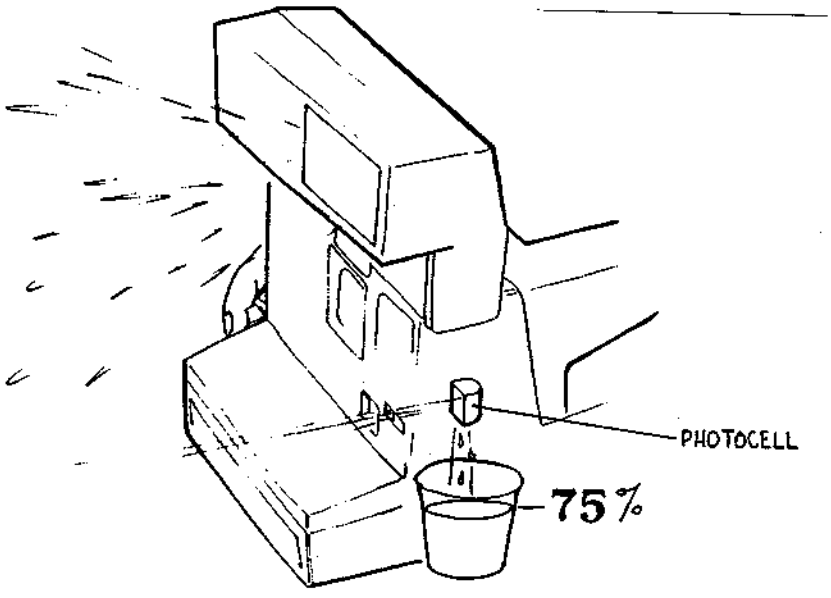


19. Now, let's go back to the three conditions in which a flash picture can be taken. The first is in high ambient light. In this condition, there is so much scene light available that the photocell always wins the race to fire the flash. This is the Fill Flash mode of operation.



20. In the high ambient or Fill Flash mode, the photocell measures scene light. When it sees 75% of the total light required for a proper exposure, the photocell fires the flash.

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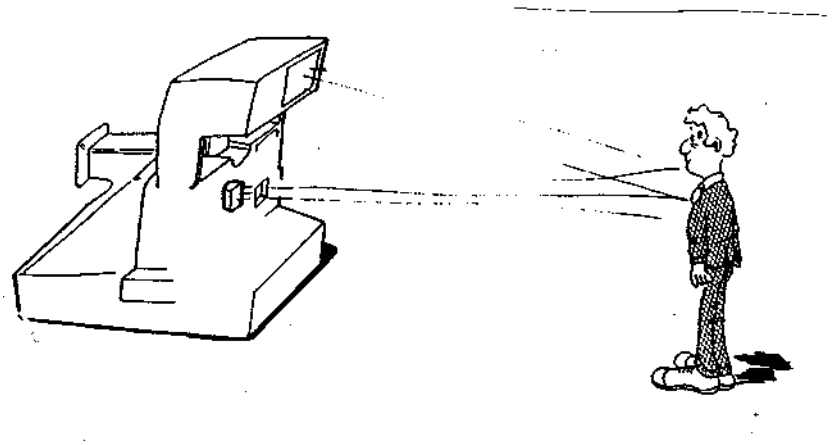
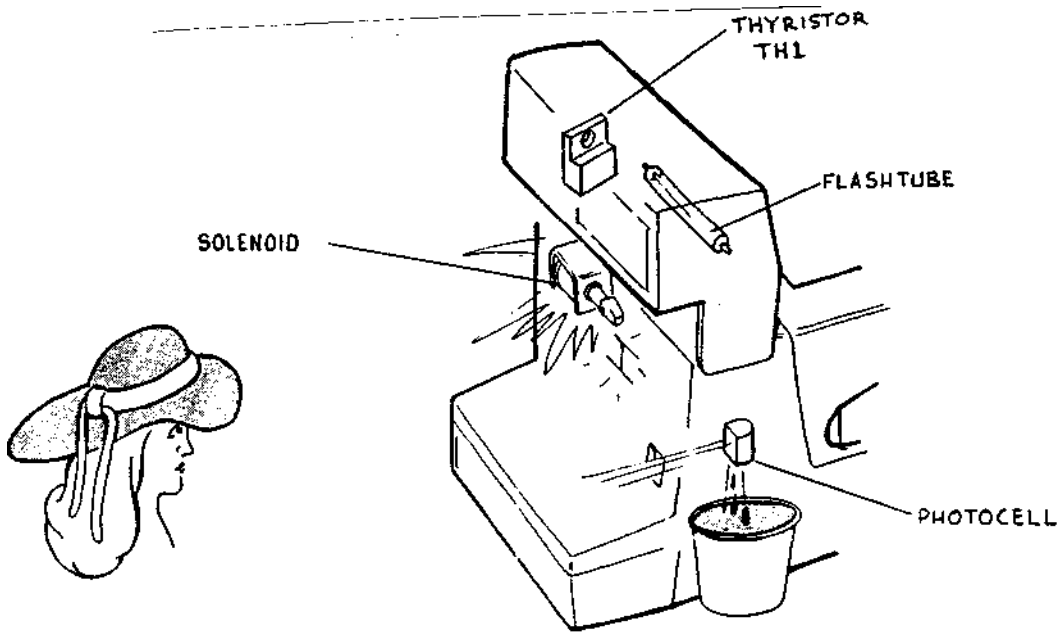


21. At this point, the blades are still open and the exposure is being made. The photocell continues measuring light which now includes the light bouncing back from the flash. Next, the camera must decide when to shut down the flash and when to close the shutter blades.



22. In the high ambient (Fill Flash) mode, the photocell makes the decision to shut down the flash and close the shutter blades. It does this when it sees the remaining 25% of the light required for a proper exposure. (This light is provided by the flash.) The camera logic signals the flash to quench and commands the solenoid to close the blades.

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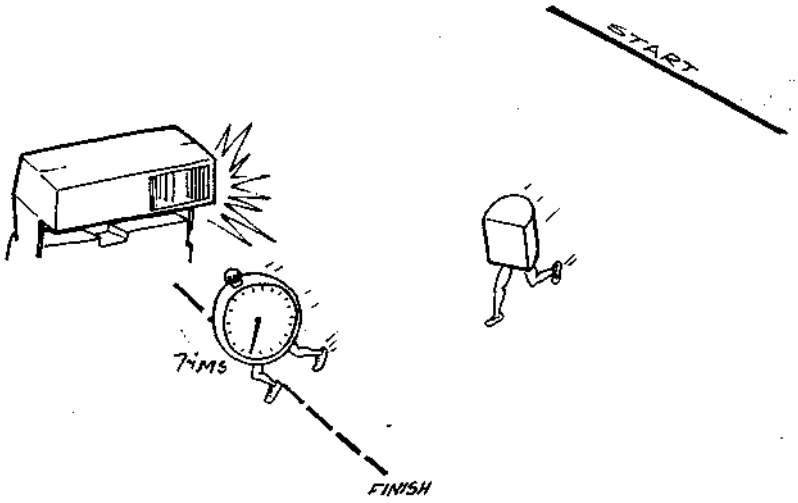
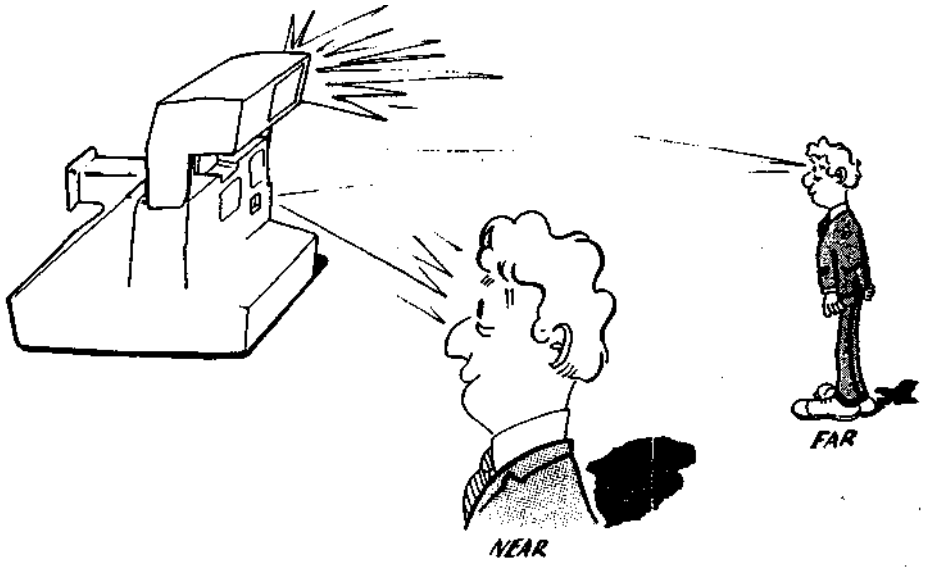


23. The next condition in which a flash exposure can be made is in a low ambient condition (low light level, outdoor scenes and all indoor scenes). In this condition, there is so little light that the clock beats the photocell in the race to fire the flash. When the clock reaches 74 milliseconds (ms), the flash is fired.



24. Two milliseconds after flash fire, a very important question is asked by the camera logic: Is the subject near or far? The answer is needed to properly set the clock for time-out.

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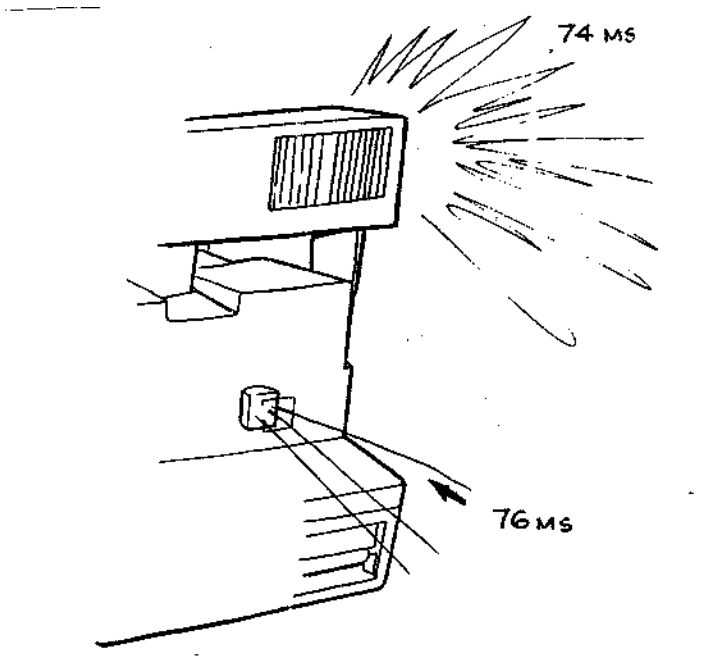

25. The question is answered by measuring the amount of light seen by the photocell two milliseconds after flash fire.

MORE THAN 50% = NEAR

LESS THAN 50% = FAR

26. If the measurement is equal to or more than 50% of the light needed for a proper exposure, the camera senses subject is NEAR. If the measurement is less than 50% of the light needed for a proper exposure, the camera senses that the subject is FAR.

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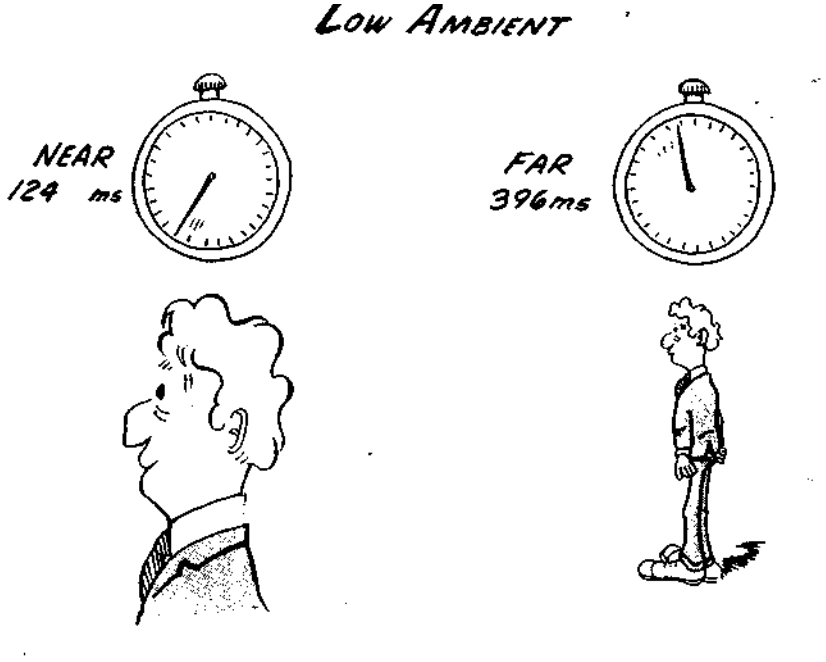
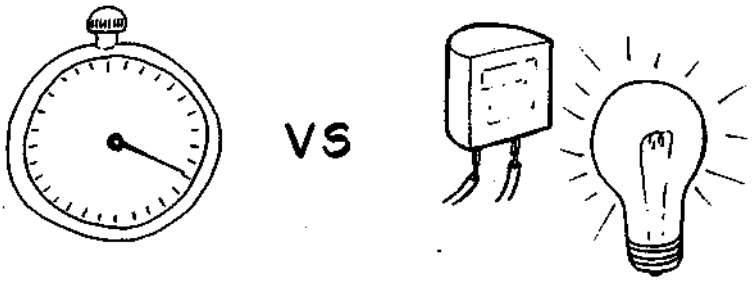


27. For NEAR subjects the logic instructs the clock to stop the exposure at 124 ms after the blades open. For FAR subjects the clock will time-out at 396 ms to stop the exposure.



28. However, the ending of the exposure is also subject to the photocell light measurement. In other words, for a Low Ambient NEAR or FAR picture, there is still a race between the photocell and the clock to shut down the flash and close the blades.

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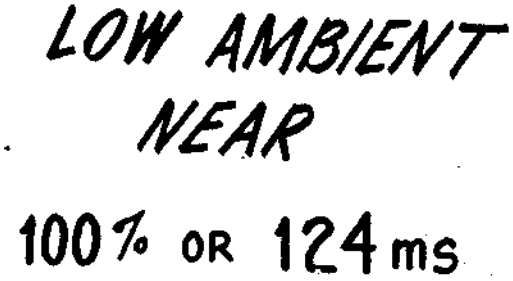
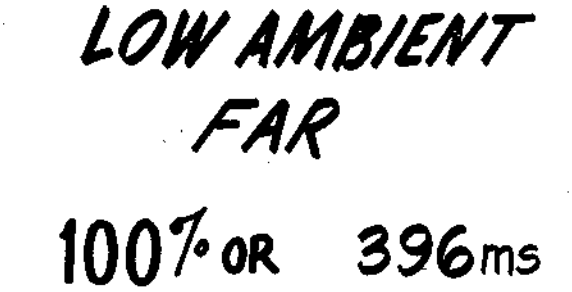


29. In low ambient NEAR conditions, the flash will shut down and the blades close either when the photocell has seen 100% of the light necessary for a proper exposure or when the clock times-out at 124 ms.



30. In low ambient FAR conditions, the flash will shut down and the blades close either when the photocell has seen 100% of the light necessary for a proper exposure or when the clock times-out at 396 ms.

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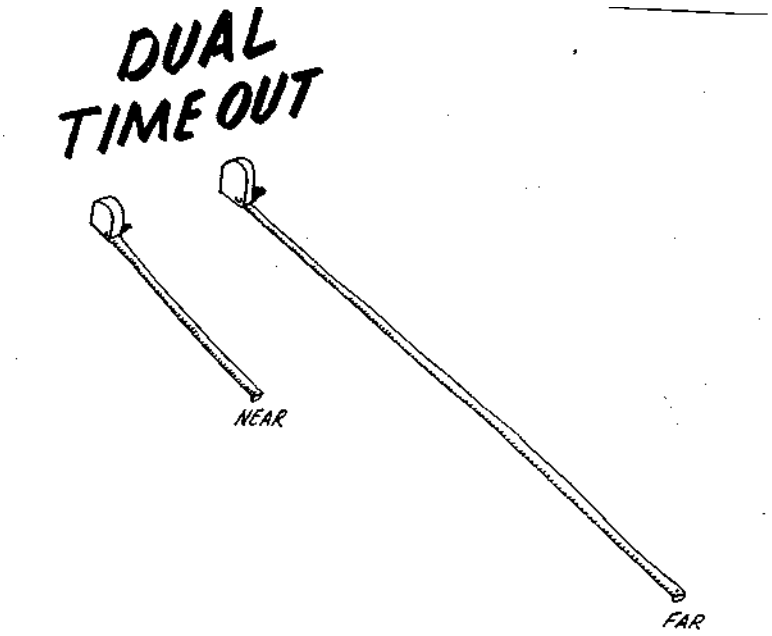
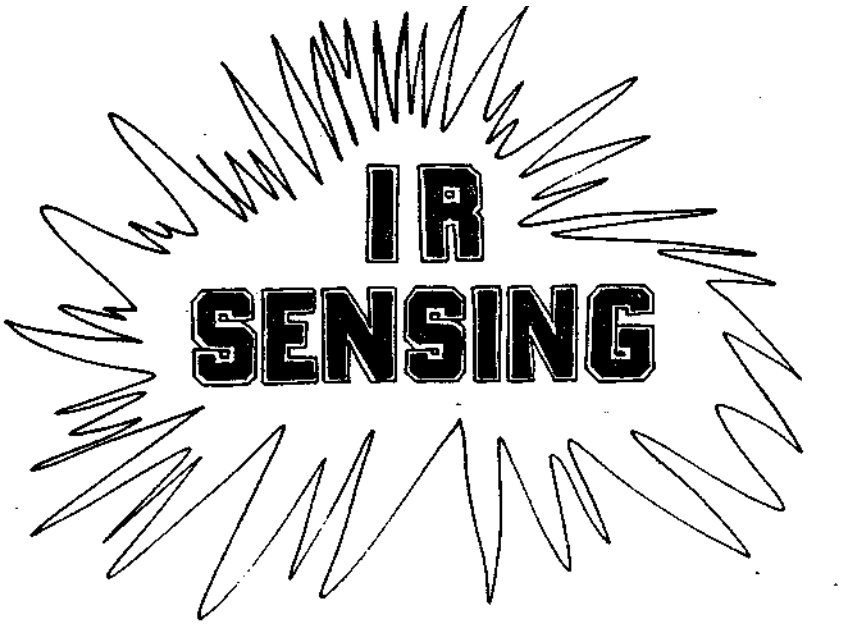


31. The different clock settings for Low Ambient conditions are called the DUAL TIME-OUT SYSTEM. They allow long time-outs for distant, low-light scenes such as a sunset or an auditorium shot, or limit the length of the exposure for close-in scenes to minimize camera or subject motion.



32. So far we've talked about the photocell measuring scene light to control the exposure, but we haven't mentioned the most significant part of the light measurement system: Infrared Sensing.

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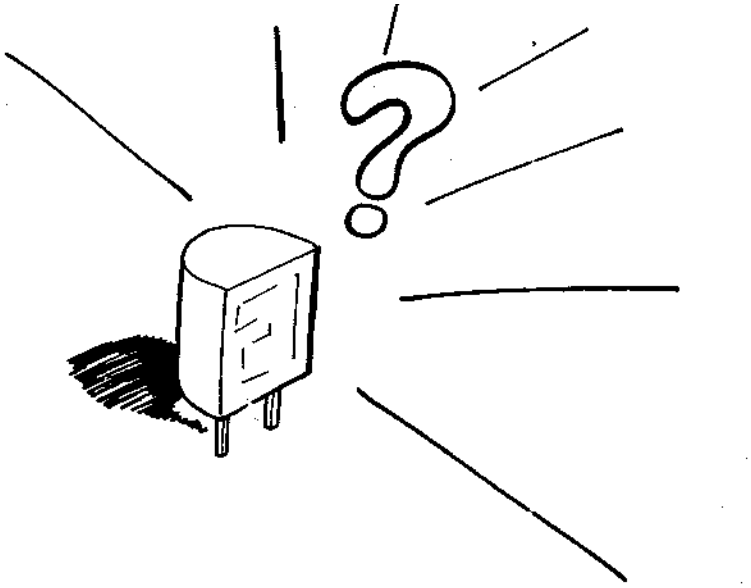
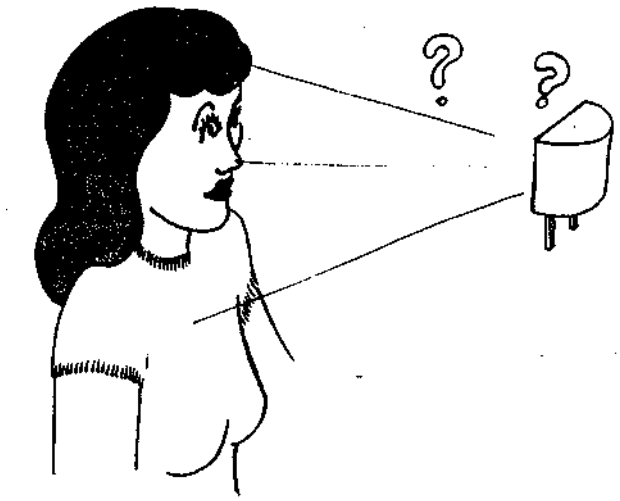


33. In earlier cameras where a photocell was used to control the exposure, the photocell could be fooled into giving a reading which did not result in a good picture.



34. This was especially true of flash pictures taken of subjects close to the camera. Light-colored clothing would reflect too much light to the photocell causing it to stop the exposure too soon.

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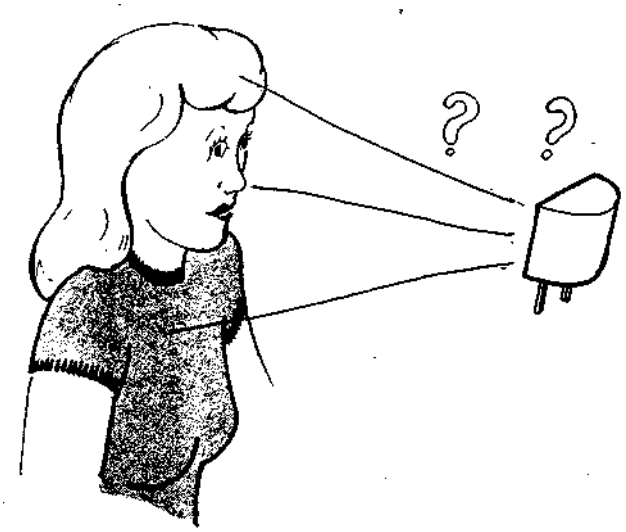
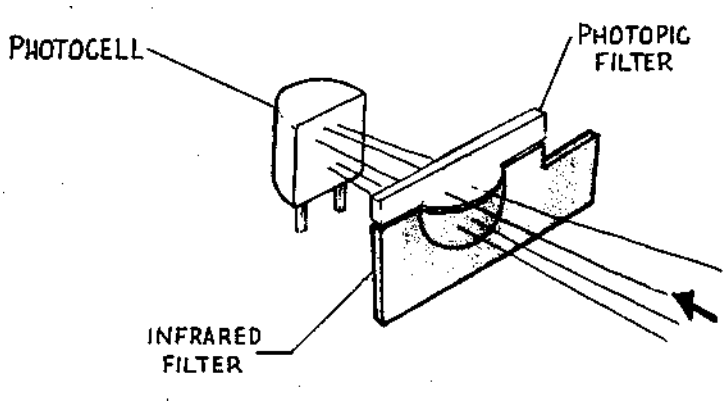


35. On the other hand, dark clothing would fool the photocell into timing out a long exposure, since relatively little light was reflected back. This would result in a washed-out face.



36. To overcome this problem, the Model 636 uses a photocell with a two-part filter in front of it, called a Dynamic Infrared Photometer system. The top half of the filter passes visible light which the human eye can see. This light is used to time exposures for non-flash, fill-flash, and low-light, distant scene flash pictures. The top filter is a *photopic filter*.

The bottom half of the filter passes infrared light which is invisible to the human eye, but which the film can see. This light is used to time exposures for flash pictures in low light where the subject is near the camera. The bottom filter is called the *infrared filter*.

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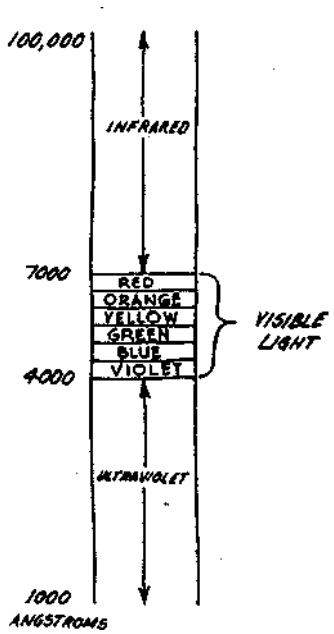
37. Now you may be wondering why infrared measurements greatly reduce over- or under-exposures in close-up flash pictures.



38. This chart shows the light spectrum. In the infrared region of the spectrum, a strange phenomenon occurs. The light reflected off just about all materials is equal. Therefore, the light passing through the infrared filter is balanced, preventing the photocell from being fooled by contrasting levels of light or dark subject matter.

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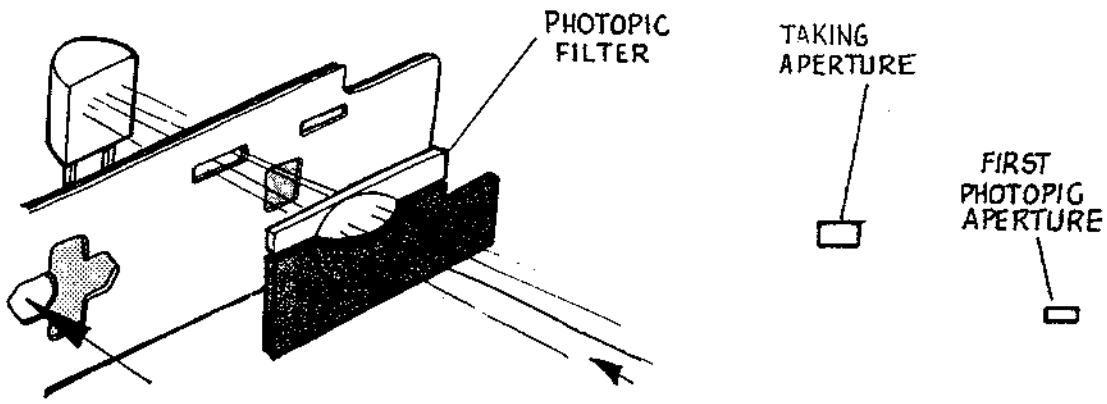
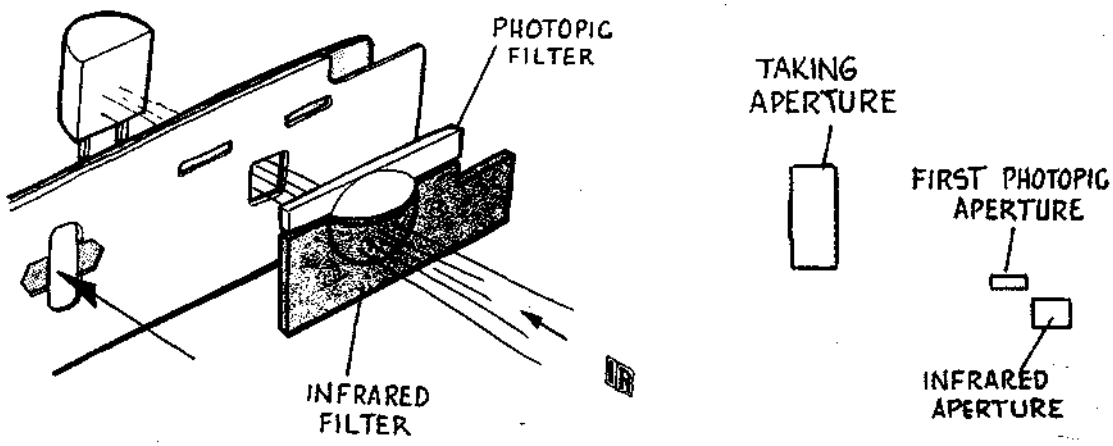


39. For Fill Flash pictures, the shutter blades open as shown here. The blades are set so only visible light passes through the first photopic aperture to the photocell. Thus, for Fill Flash, exposure shutdown is based on the measurement of visible light only.



40. In a low light NEAR shot, the blades travel farther. During blade travel a very small amount of visible light passes through the first photopic aperture. The blades move to the position shown, the strobe fires and a larger amount of infrared light passes through the infrared aperture to the photocell. Exposure shutdown is dependent upon the combination of an extremely limited amount of visible light added to the larger amount of infrared light (or on the clock time-out).

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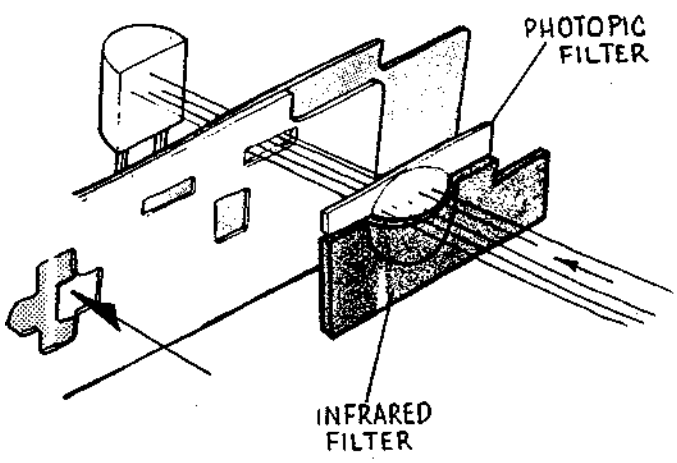
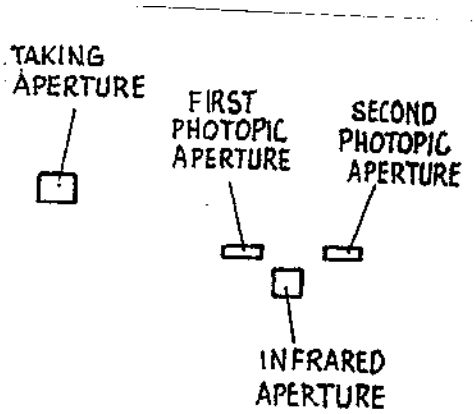
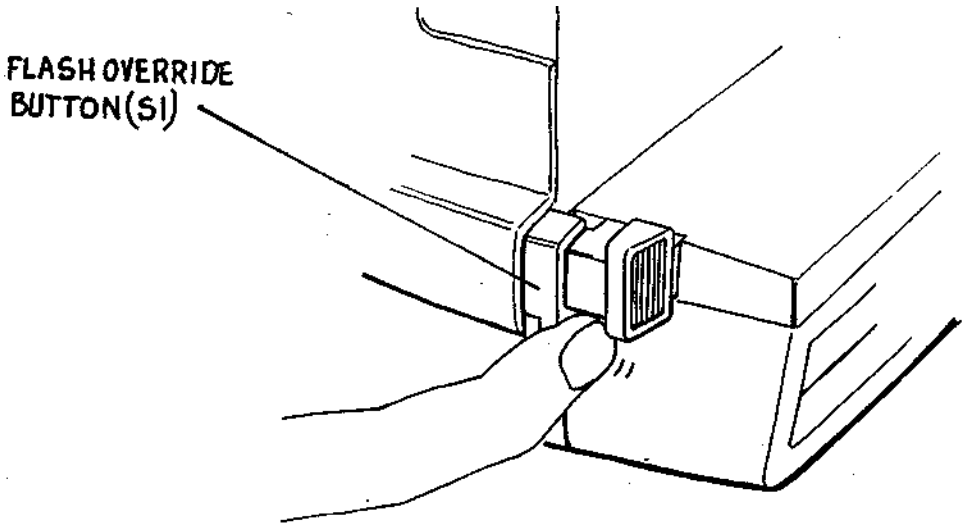




41. For low light FAR pictures, the blades travel even farther. First, there is a very small amount of light passed through the first photopic aperture. Next, a very small amount of light passes through the infrared aperture. Finally, the blades open fully and a large amount of visible light passes through the second photopic aperture. The exposure shutdown is dependent on the measurement of this combination of light (or on clock time-out).



42. The flash may be bypassed on those rare occasions where it is not desired. This is pretty much limited to taking pictures in daylight through a window. In this condition, the flash can be prevented from firing by pressing only the back part of the exposure button. Exposure shutdown is determined by the photocell seeing 100% of the light required for a proper exposure or by the internal clock timing out at 396 ms.

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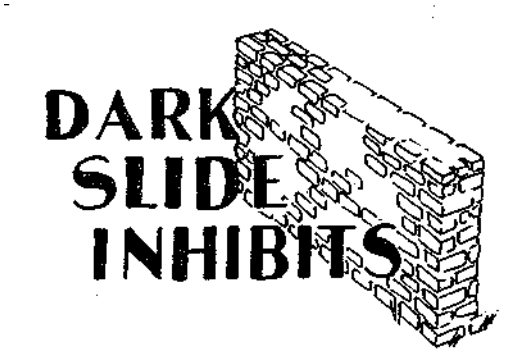
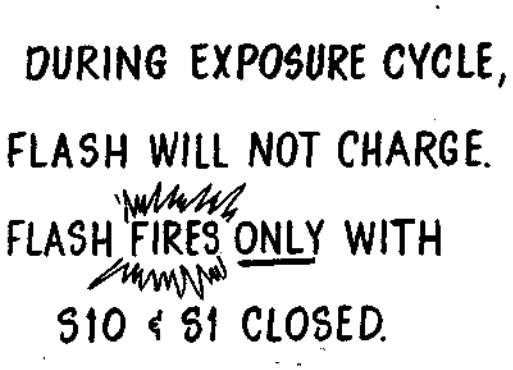


43. The dark slide cycle is the same as in Pronto! type cameras. When a fresh pack is loaded and the front door closed, S1 and S9 are closed and the solenoid energized. The S5 actuator drops, closing S5L and S5P, turning on the motor. The dark slide is ejected and the counter set to 10. The slider is cammed back by the counter, opening S1 and S9. The rotation of the timing gear lifts the S5 actuator, opening S5L and S5P. The camera is now ready for the exposure cycle.



44. During an exposure cycle, the camera electronics prevents the flash from being recharged. Also, once the flash is charged, S10 must be closed along with S1 to fire the flash. You cannot release S10 and press only S1 to fire the flash.

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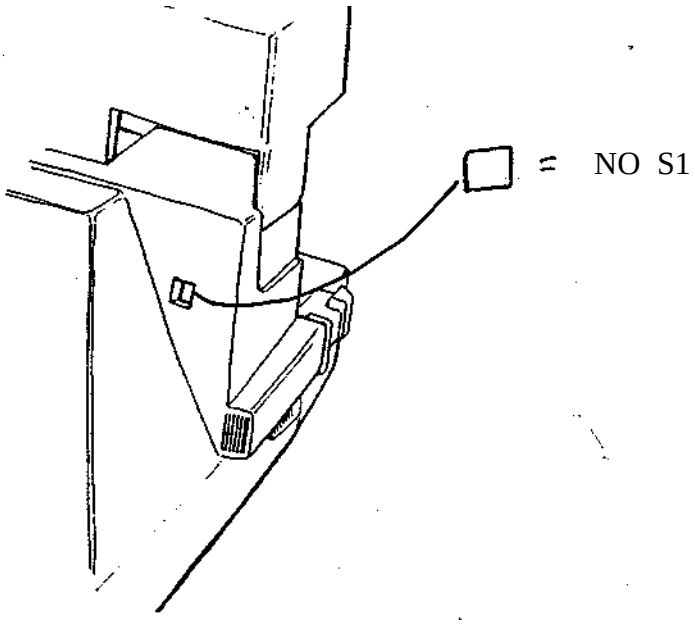
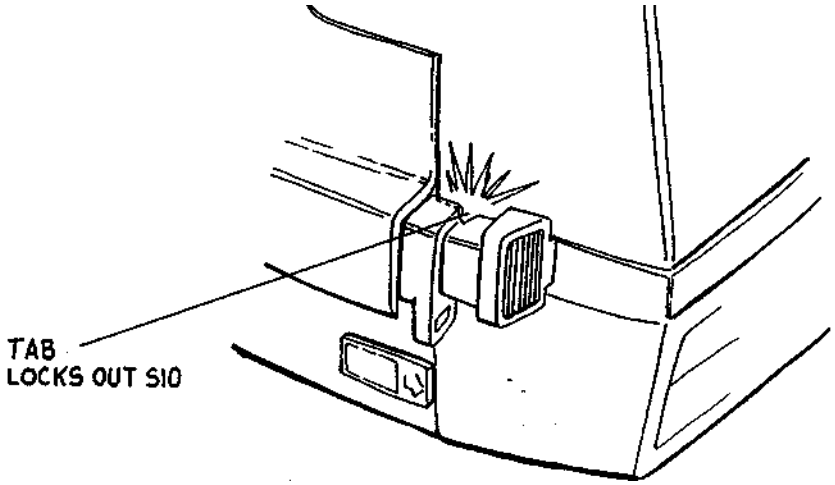


45. There are two mechanical inhibits. When the counter reaches its blank setting, S1 is prevented from closing. This is the same as the empty pack lockout feature on Pronto! cameras.



46. Finally, when the camera is in the folded position, S10 is mechanically locked open by a tab on the flash housing. This prevents the flash from being charged.

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SECTION 4 - MODEL 636 DISASSEMBLY AND REASSEMBLY

Tools needed

Dump Probe P/N 11604
Universal Flex Remover Tool P/N 12601
Strobe Housing Removal Tool P/N 12633-2
Viewfinder Panel Remover P/N 12552-3
Contact Removal Tool P/N 12536

3/32" diam. dowel pin (for Shutter Blade reassy)
Exacto knife with No. 11 blade
Soldering aid ("greenstick") P/N 94168
Finger cots or lintless cotton gloves
Needlenose pliers
Tweezers and dental pick

Disassembly Note

No screws or threaded fasteners are used in the 636 Camera: most housings and piece parts of sub-assemblies are held in position by detents, spring catches or tangs which engage bosses or cutouts in corresponding mating parts. Careful "spring apart" techniques will free most parts of the 636.

Flex connecting tabs are held in their solderless contacts by internal spring contact pressure. Safe, easy removal of the flex is done by inserting the appropriate size leg of Universal Tool 12601 into the connector. This releases the grip of the internal contacts and allows the flex to be pulled out together with the removal tool.

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Note: Reassembly instructions are listed in the contents above, only if they include specific, detailed steps (in contrast to simply replacing parts removed).

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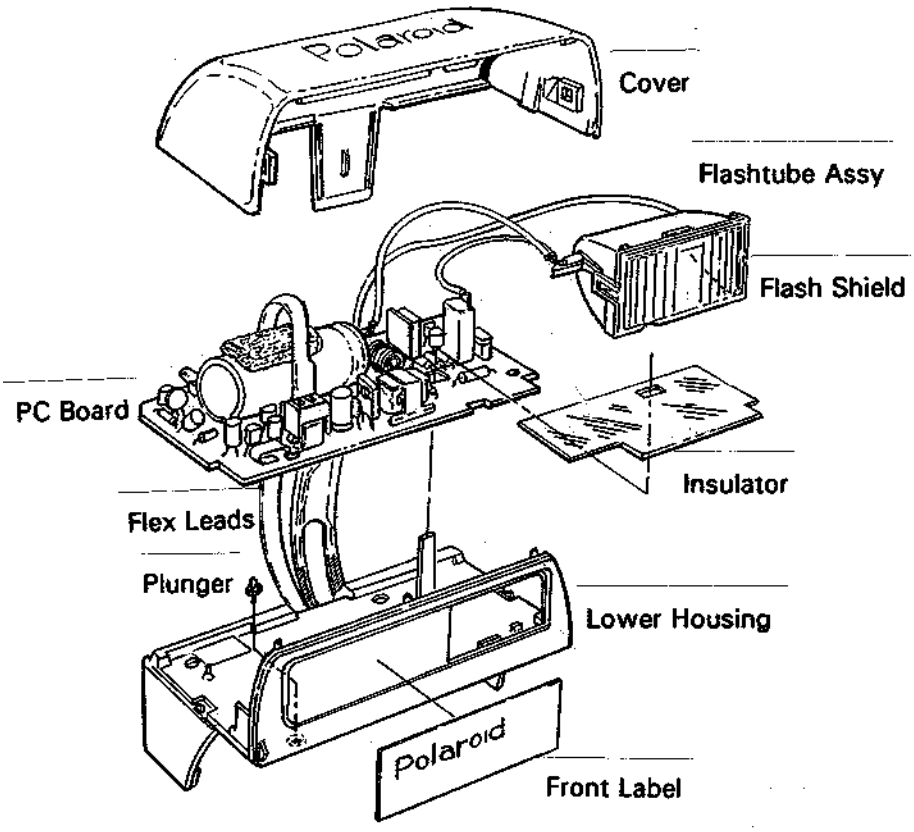
Strobe Disassembly



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1. Remove Strobe Cover using removal tool 12633. Insert tool in hole on right side underside of Housing and tilt bottom of tool to the right (CCW) to release molded catch inside cover (A in Fig. 1). Repeat process on left side, tilting bottom of tool to the left. Lift off Cover.

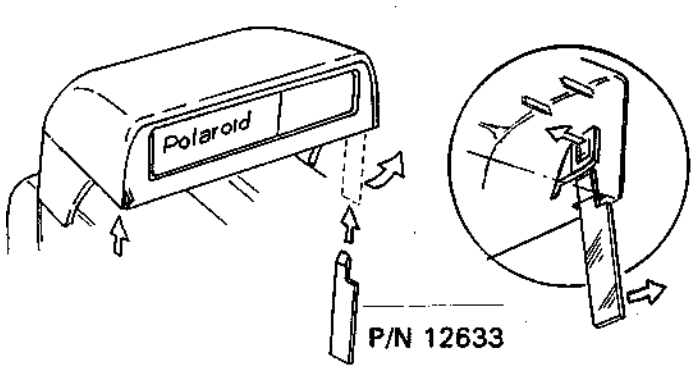

Fig. 1 Removing Strobe Cover

2. Discharge Strobe Capacitor by holding Dump Probe 11604 on Capacitor terminals for 5 - 10 seconds (Fig. 2).

CAUTION: SHOCK HAZARD! Dump capacitor **BEFORE** proceeding with disassembly, to avoid painful shock from charged capacitor.

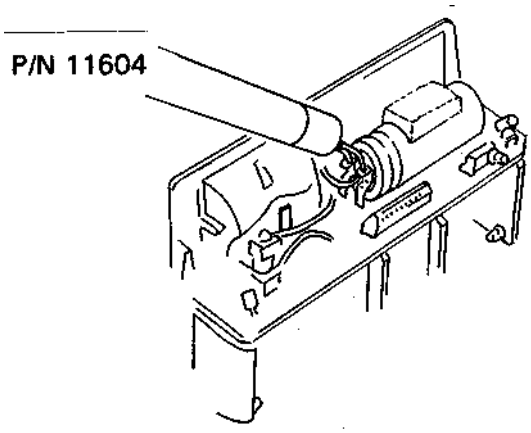

Fig. 2 Discharging Strobe Capacitor with Dump Probe

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3. With Strobe tilted downward at a 45-degree angle, remove Lower Housing Assembly using a soldering aid tool (greenstick). Carefully spring out sides as shown in Fig. 3 (Flex remains connected to Lower Housing).

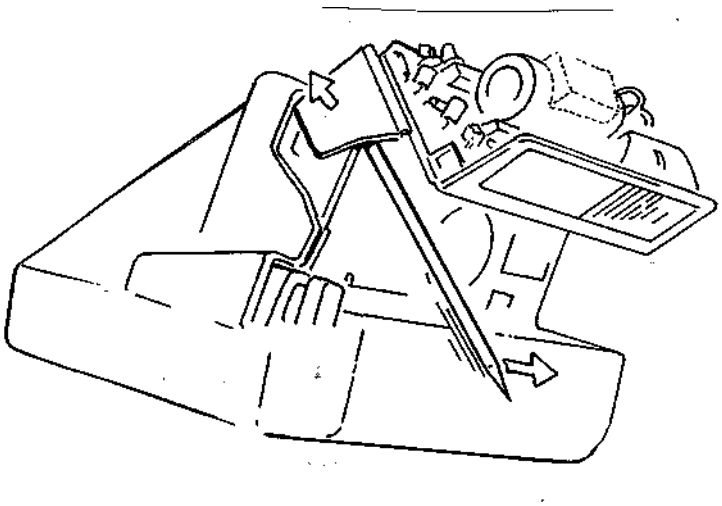

Fig. 3 Removing Lower Housing

4. Remove two Flex leads from PC Board by inserting appropriate-size fingers of Universal Flex Tool 12601 into Board connectors and pulling Flex out (Fig. 4).

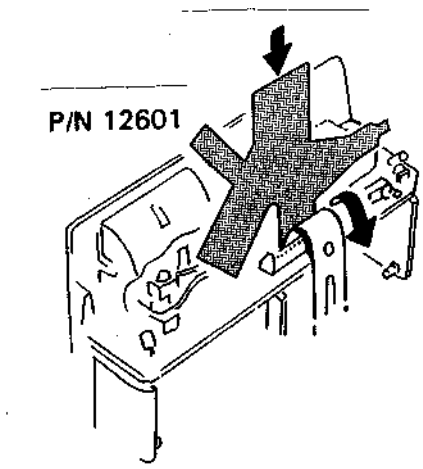

Fig. 4 Removing Flex from Lower Housing

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5. Remove Flashtube Assembly from the Lower Housing by gently pushing in along top edge of Flash Shield (Fig. 5). Remove Insulator, and unsnap catches on ends of Flash Shield to remove it from Flashtube Assembly.

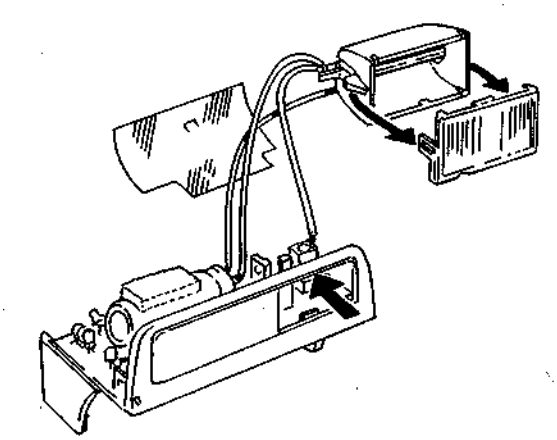

Fig. 5 Removing Flashtube Assembly, Flash Shield and Insulator

6. If it is necessary to remove the Flashtube itself, unsolder the three leads from the Capacitor, PC Board and Trigger Coil (Fig. 6).

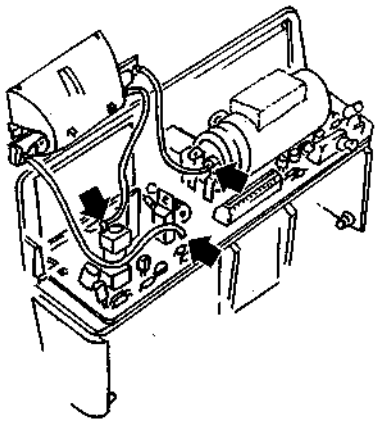

Fig. 6 Removing Flashtube by unsoldering wire leads

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7. Remove the PC Board by lifting it straight up off the molded post on the Lower Housing (Fig. 7), being careful not to lose the small S10 Plunger from the base of the Lower Housing. Set Plunger aside.

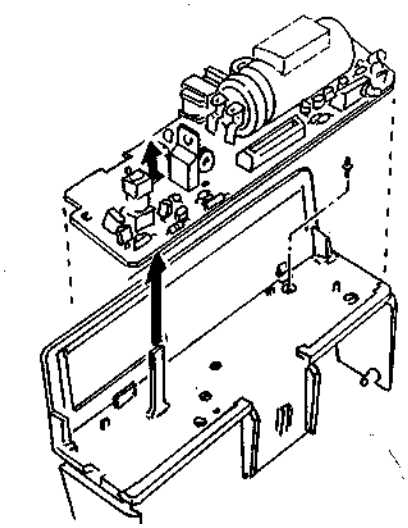

Fig. 7 Removing PC Board & Flashtube Assembly & Plunger

Strobe Reassembly

Replace the parts removed in the preceding Steps 1 - 7, in this order:

Flash Shield
Plunger in hole in Lower Housing
PC Board onto two posts in Lower Housing
Insulator
Flashtube Assembly into Lower Housing

Insert the Lower Housing pivots into the openings in the Apron.

Reconnect the Flex to the PC Board.

Replace the Cover by inserting the tab and snapping the Cover into place on the Lower Housing.

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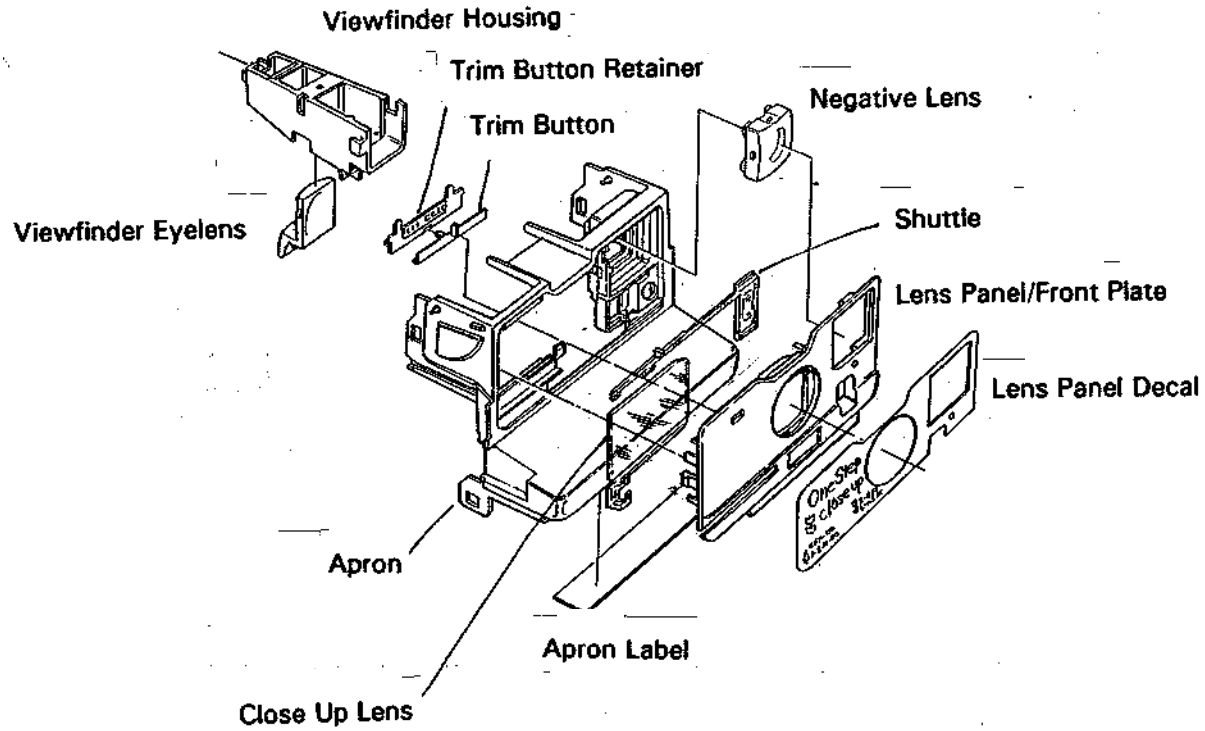
Apron Disassembly



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8. Open the Film Door to remove the Apron. Insert a soldering aid, first at position A and then B (Fig. 8), to free the Body detent lugs from the Apron. Carefully "lever" the Apron out of the Body. Repeat the process on the opposite side. The S1 Button and S10 Button with Return Spring will fall out.

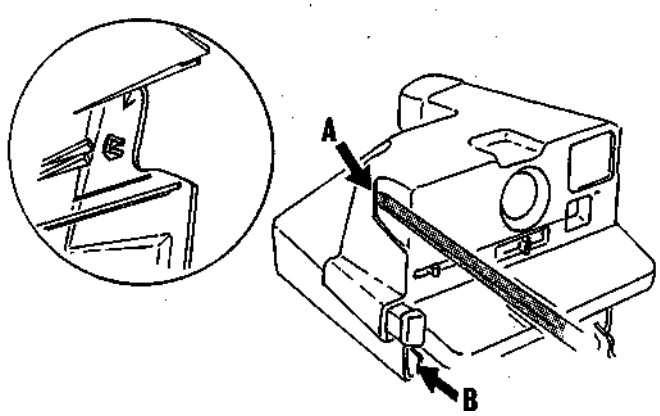

Fig. 8 Removing the Apron from the Camera Body

9. Disassemble the Apron using a soldering aid. First, remove the Panel containing the Close Up Lens and Trim Button Assemblies. Release the tabs at A and B (Fig. 9) which hold the Panel to the Apron, then tilt out the top and lift it out, freeing lip along the bottom edge.

(If it is necessary to remove the adhesive Lens Panel Decal from the Panel, gently work a greenstick under a corner of the Decal and peel it off.)

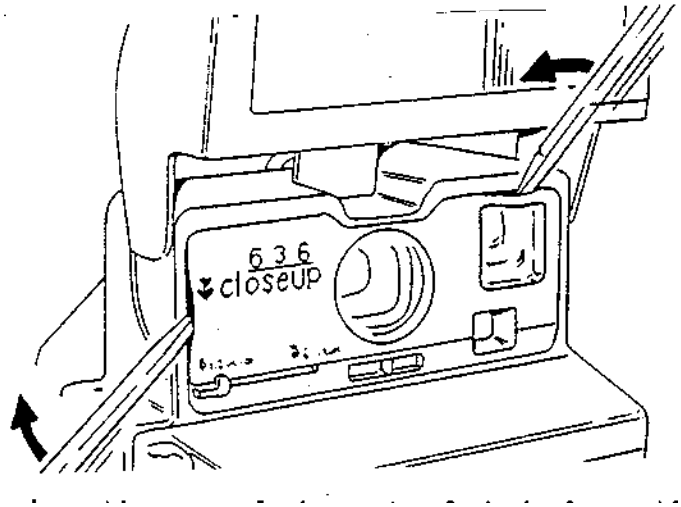

Fig. 9 Removing the Panel (Front Plate) from the Apron

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10. Disassemble the Close Up Lens, wearing finger cots or lintless gloves. First, remove the Spring with tweezers (Fig. 10).

Next, slide the Shuttle to the left and lift its left end to remove.

Now slide the Close Up Lens to the right and with a green-stick under the right end, carefully lift the Lens until the top edge clears the detent on the Panel.

Remove the Trim Button and Retainer by lifting each end of the Retainer away from molded pin on the back of Panel (Fig. 10).

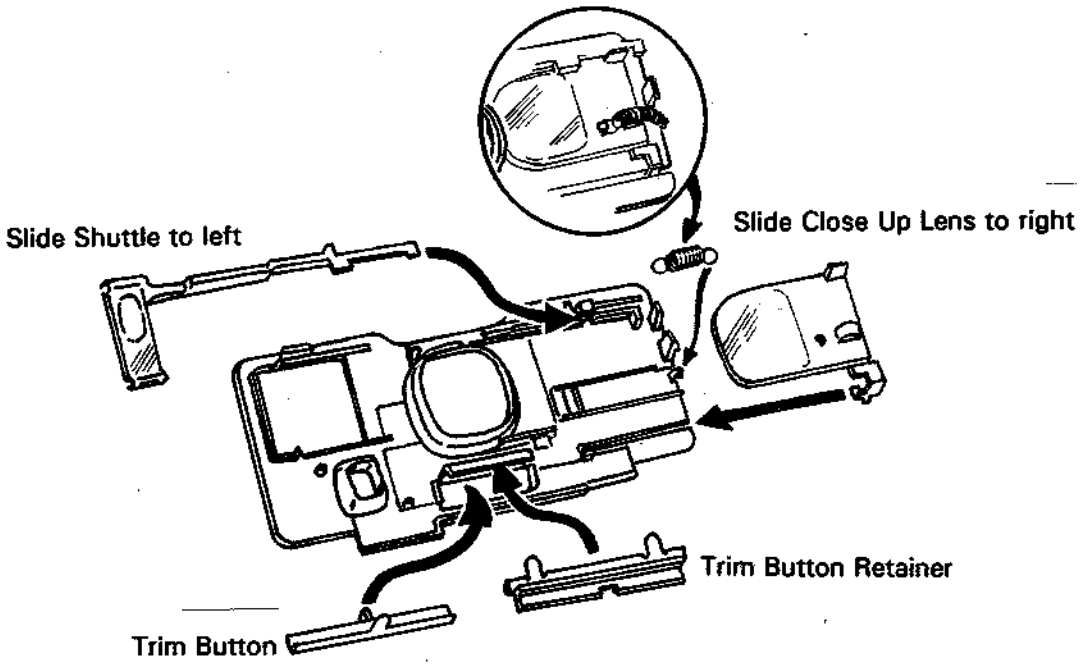

Fig. 10 Disassembling Close Up Lens & Trim Button

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Reassembling the Close Up Lens & Trim Button

11. Wearing finger cots or lintless gloves to keep the Lens elements free of smudges, first engage the "foot" at the bottom right corner of the Lens with the Panel (see Fig. 11). Then slide the Lens to the left slightly and gently press down until it engages in its guides. The Lens should slide back and forth freely.

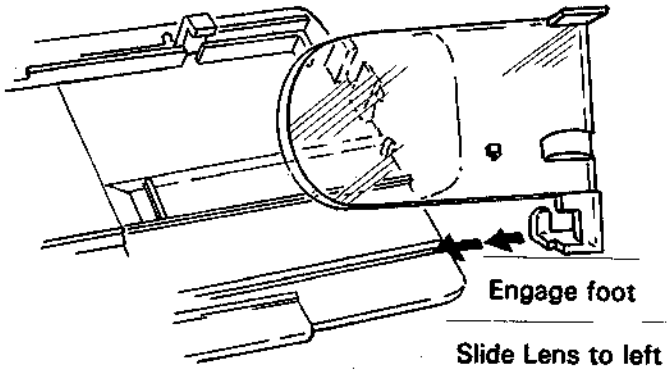

Fig. 11 Reassembling the Close Up Lens

12. Replace Shuttle by first sliding Lens to the left (Fig. 12). Do not replace Return Spring yet. Now slip the right end of the Shuttle under the guide on the Panel. Slide the Shuttle to the right into place. (The tab on the top of the Lens must be between the tabs on the Shuttle.) Replace Lens Return Spring; check that Lens operates smoothly.

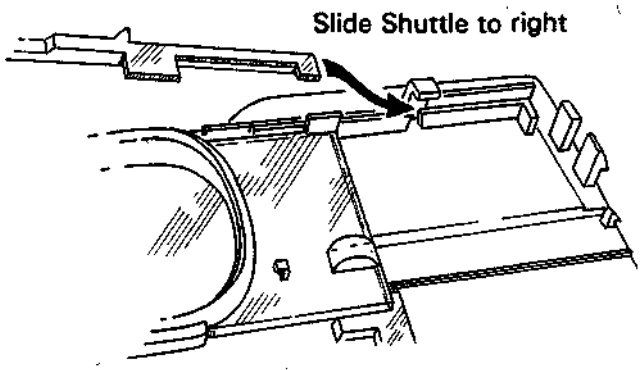

Fig. 12 Replacing the Shuttle in the Close Up Lens

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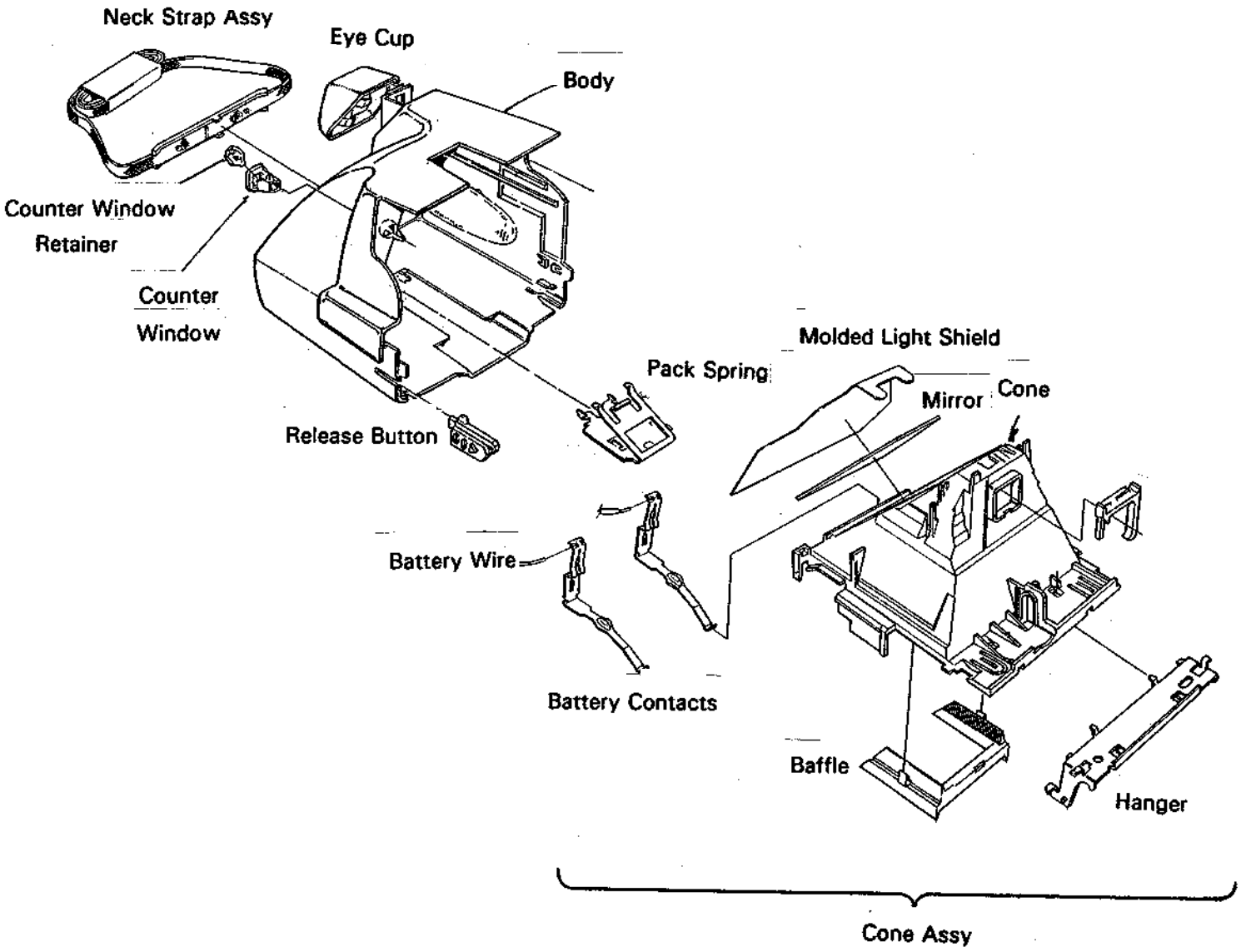
Body Disassembly



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13. To remove the Cone, insert a flat blade screwdriver at the locations shown in Fig. 13, springing out the sides of the Body slightly. This frees the Cone from the catches inside the Body. Lever the Cone forward, out of the Camera Body. The freed Release Button will drop out.

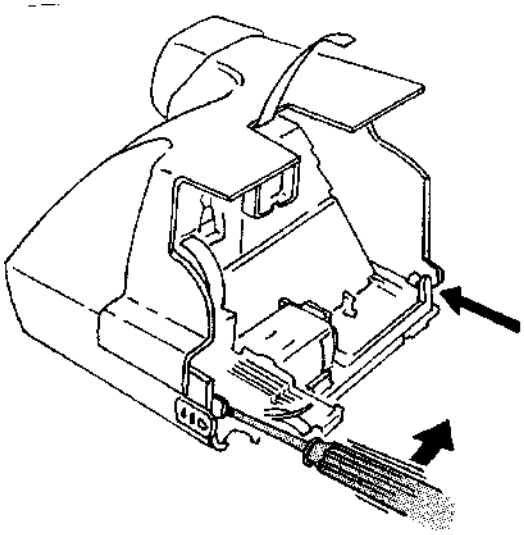

Fig. 13 Removing the Cone from the Camera Body

14. Remove the piece parts from the Camera Body, beginning with the Strap Assembly. From inside the Body, depress and release the tangs at the center of the Strap Assembly (Fig. 14). From the outside, free the ends of the Strap Assembly from the Body and remove it.

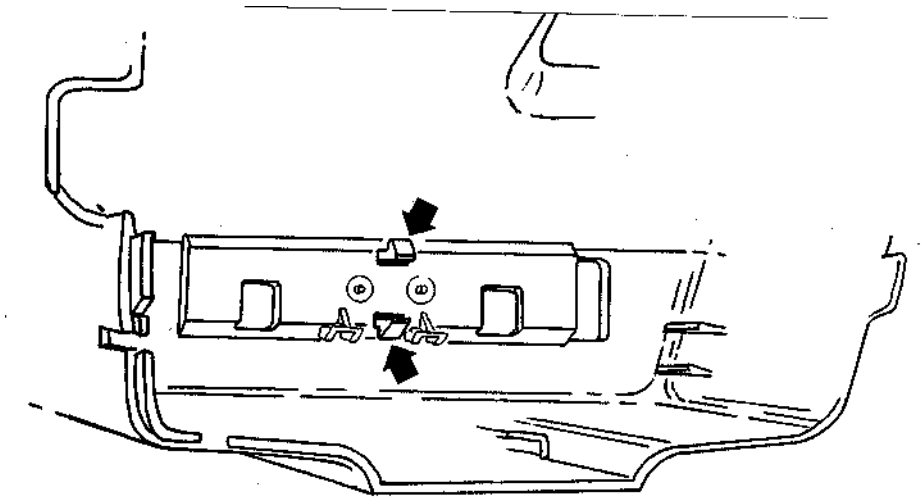

Fig. 14 Removing the Strap Assembly

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15. Remove the Pack Spring by depressing it with your thumb and pulling it forward, out of the Body (Fig. 15). (If the Camera has a Tripod Nut, it will now fall out.)

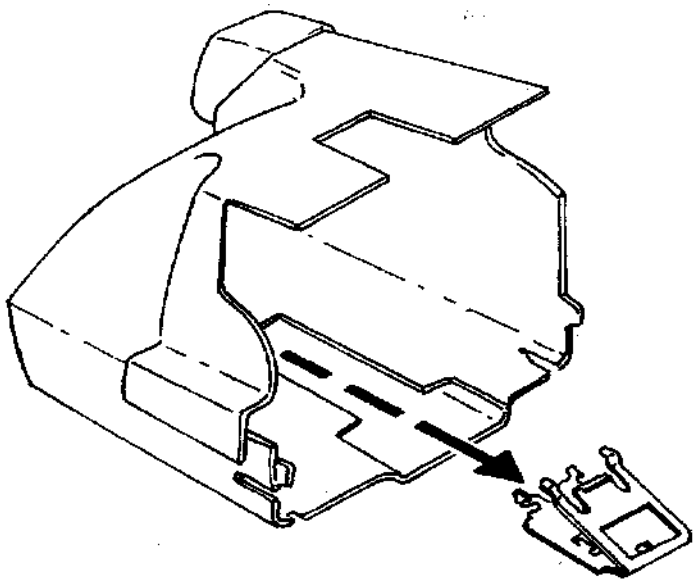

Fig. 15 Removing Pack Spring and if present, Tripod Nut

16. To Remove the Eyecup/Retainer (one unit), from inside the Body depress either pair of the four tabs shown in Fig. 16 and remove the Eyecup/Retainer.

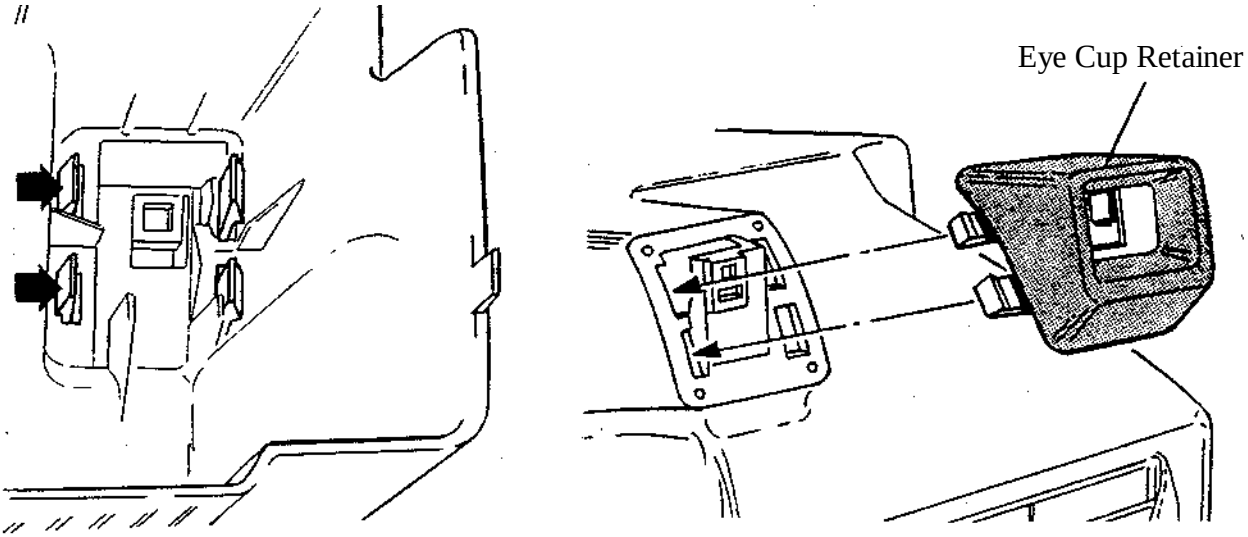

Fig. 16 Removing the Eye Cup/Retainer

Body Reassembly

Replace parts removed in Steps 14 - 16. (Pack Spring holds Tripod Nut in place.)

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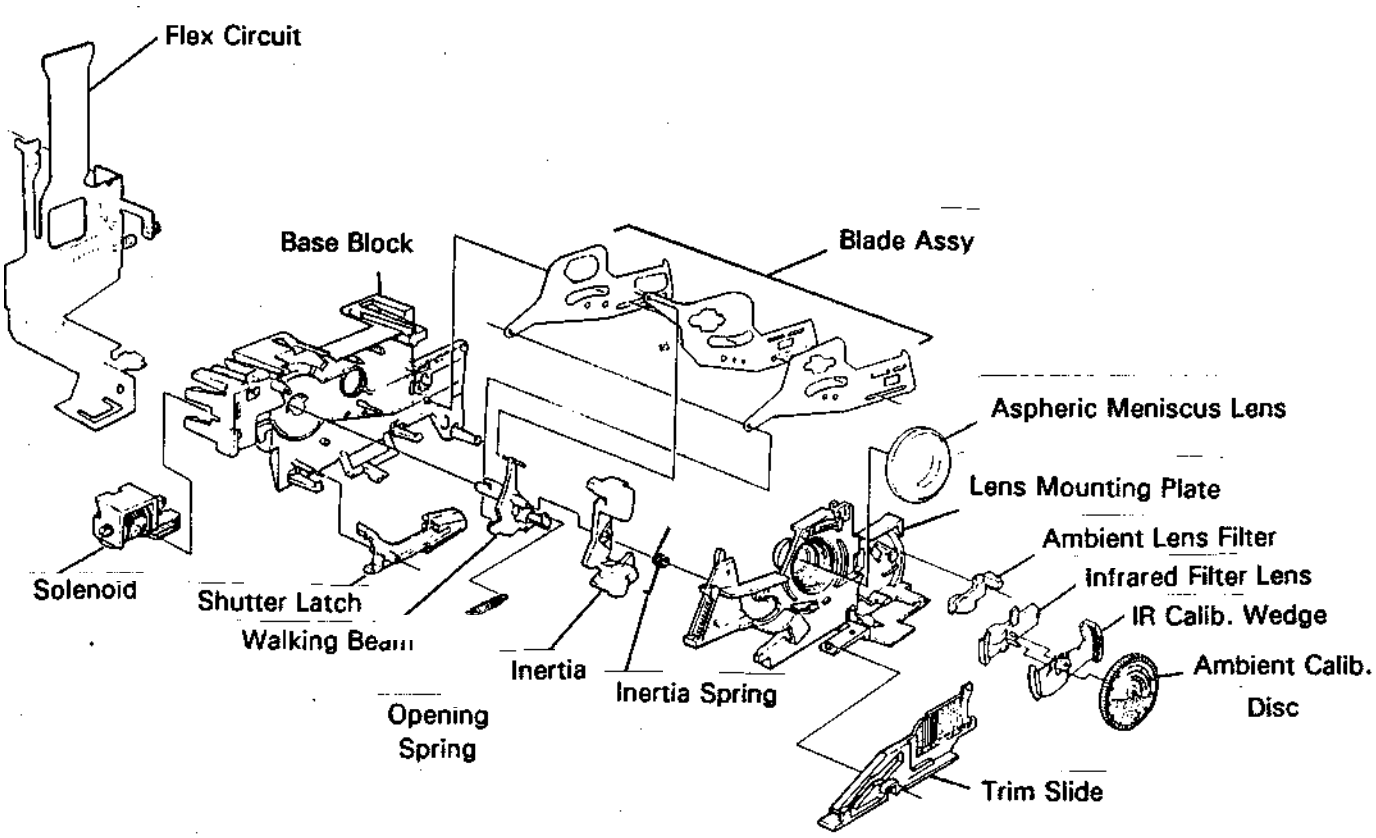
Shutter Disassembly



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17. Mount the Cone on a universal swivel fixture.

18. Remove Viewfinder Housing by tilting rear end upward (Fig. 17) and rotating it forward (note position of the tab at its left front).

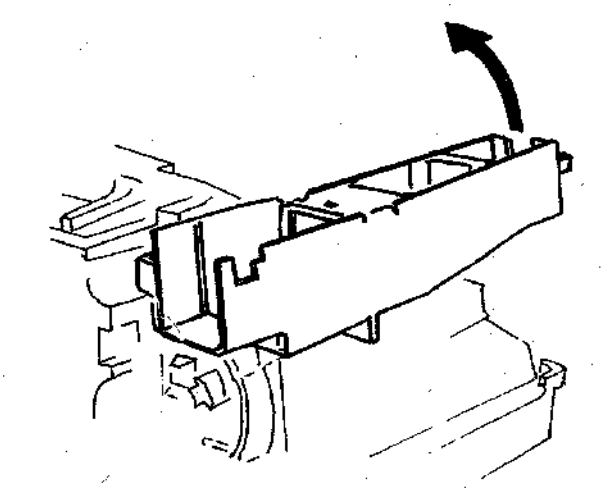

Fig. 17 Removing Viewfinder Housing

19. With tweezers, remove Opening Blade Spring from rack and Base Block (Fig. 18), first noting which notch on the rack it's attached to and marking that notch to assure correct reassembly later.

20. Remove Trim Slide by depressing the tang along its lower edge (Fig. 18).

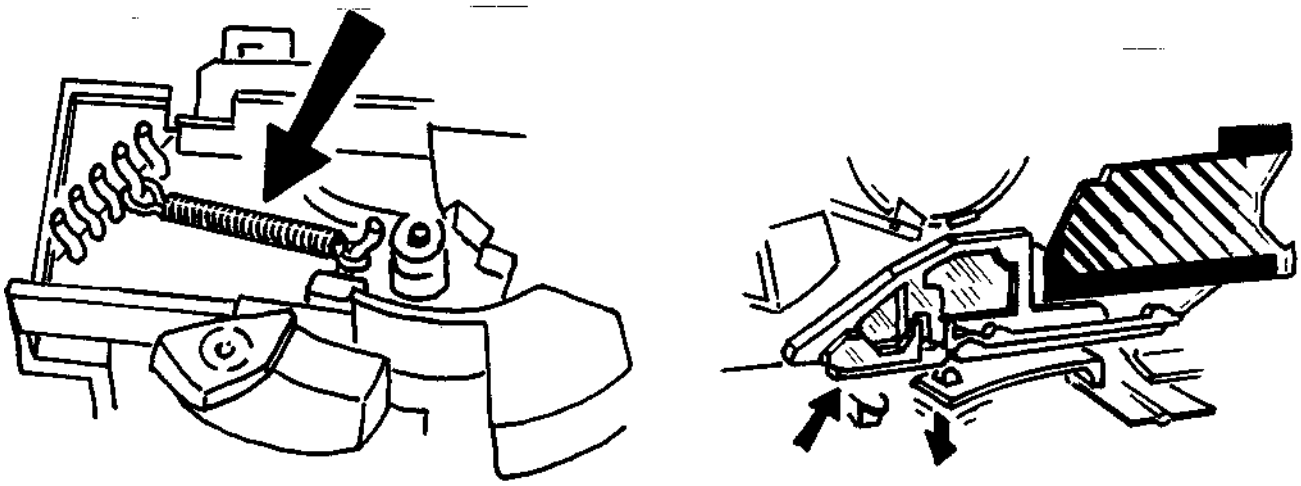

Fig. 18 Removing Opening Blade Spring & Trim Slide

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21. Remove Ambient Calibration Disk by depressing tang at bottom (Fig. 19).

22. Remove IR Calibration Wedge, IR Lens Filter and Ambient Lens (Photopic) Filter from the Lens Mounting Plate (Fig. 19).

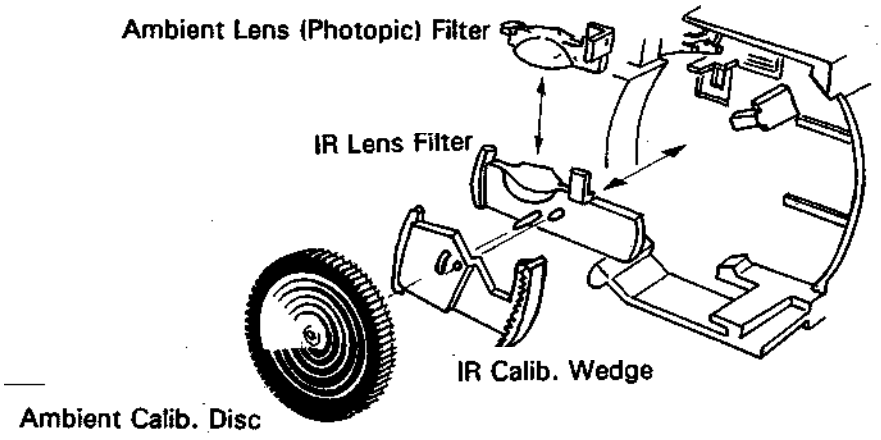

Fig. 19 Removing Ambient Calibration Disk, IR Calibration Wedge, IR Lens Filter & Ambient Lens Filter

23. Remove Lens Mounting Plate by releasing the three tangs along the bottom edge, which fastens it to the Shutter Base Block (see Fig. 20).

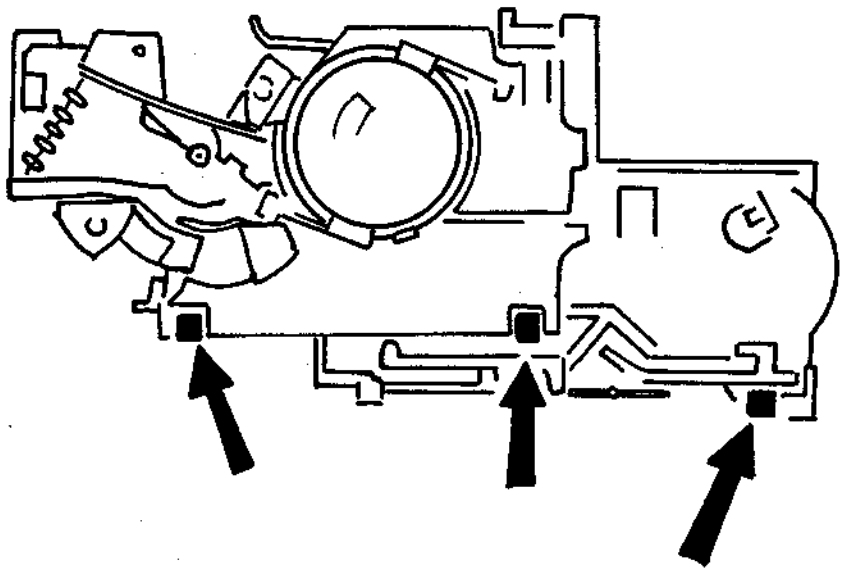

Fig. 20 Removing Lens Mounting Plate from Base Block

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24. Remove Inertia and Walking Beam as an assembly, keeping Inertia Spring in place (Fig. 21).

25. Wearing finger cots or lintless gloves, remove Shutter Latch and Shutter Blades (keep blades in the same relative positions and order in which they were removed). See Fig. 21.

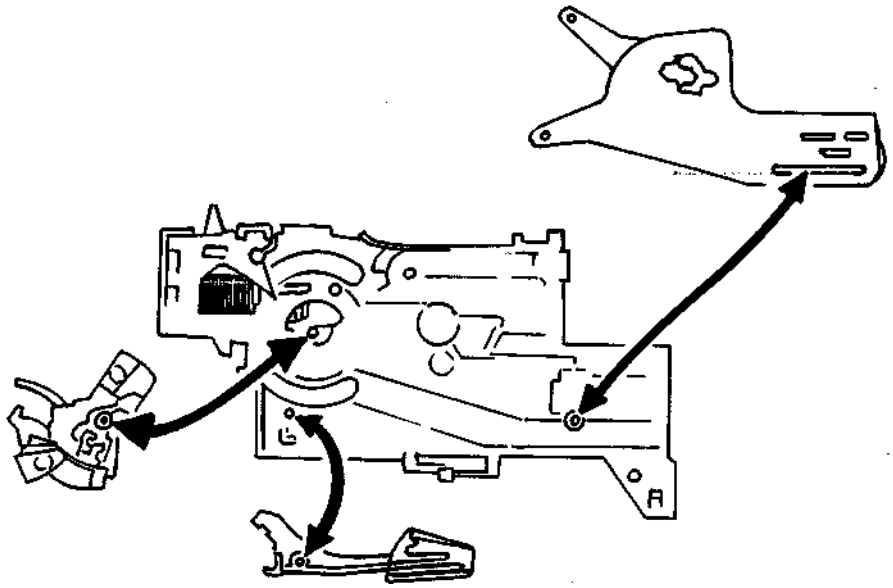

Fig. 21 Removing Inertia, Walking Beam, Shutter Latch and Shutter Blades

26. Disassemble Inertia and Walking Beam by removing Inertia Spring and lifting off Inertia (Fig. 22). To aid in later reassembly, note the trapped position of each leg of Spring before removing it.

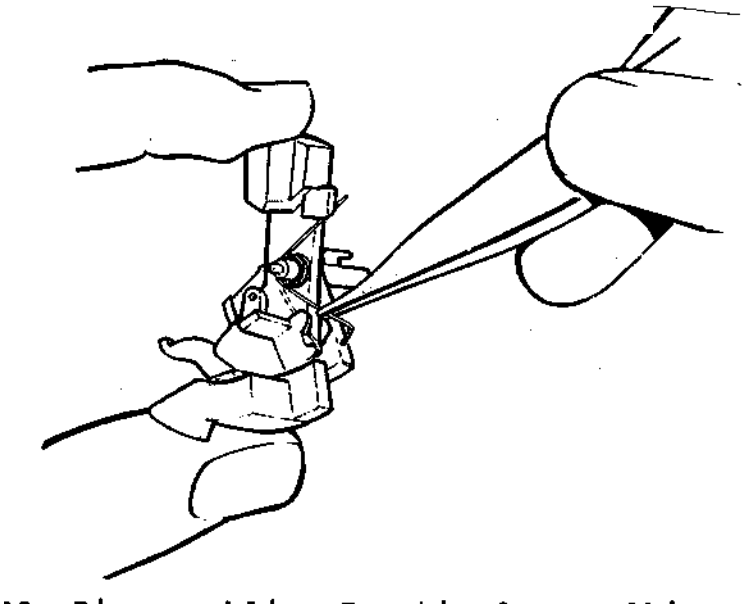

Fig. 22 Disassembling Inertia from Walking Beam

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27. Using Universal Flex Removal Tool, remove Flex from Contact Support Block and Motor (Fig. 23). Now lift Wire Block Assembly off the Cone and remove the Flex from the Wire Block (Fig. 23).

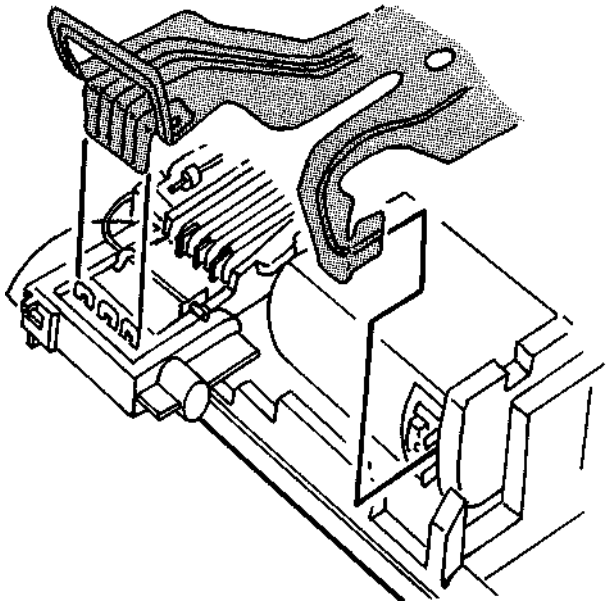

Fig. 23 Removing Flex from Contact Support Block, Motor and Wire Block

28. Remove the Base Block from the Cone by releasing the two locking tangs near Motor and Counter Wheel (see Fig. 24), swinging bottom edge of Base Block out and lifting it off the two shoulders at the top of the Cone.

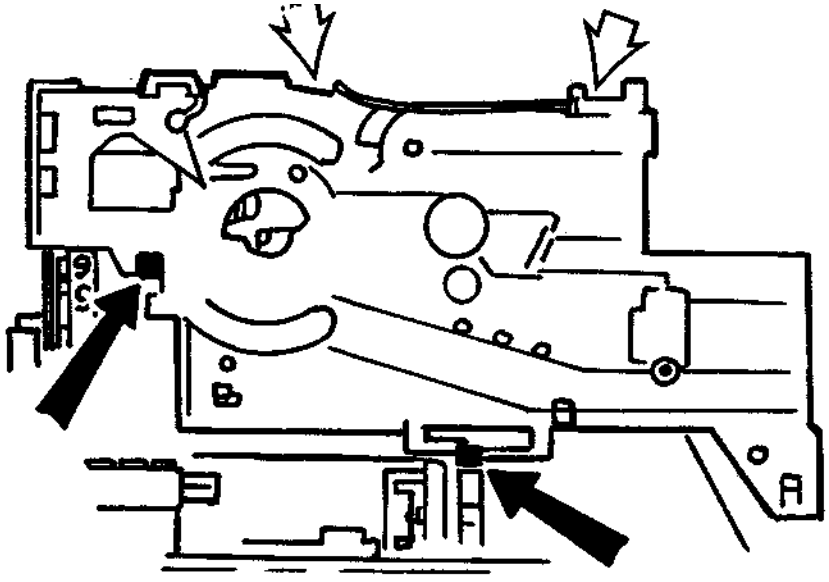

Fig. 24 Removing Base Block from Cone

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29. With Flex Removal Tool, disconnect Flex from the Solenoid connector (Fig. 25), then lift Flex up and out from under the connector block. With point of soldering aid, carefully free the Photocell (attached to the Flex) from its mounting on the Base Block (see Fig. 25).

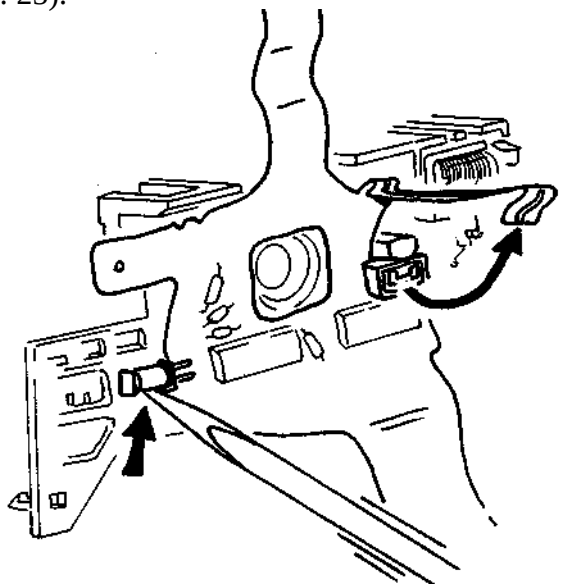

Fig. 25 Removing Flex from the Base Block

30. Using a soldering aid, remove the Solenoid from the Base Block by releasing the two tangs (see Fig. 26) Carefully pry out the Solenoid, with plunger in place, using the soldering aid as a lever.

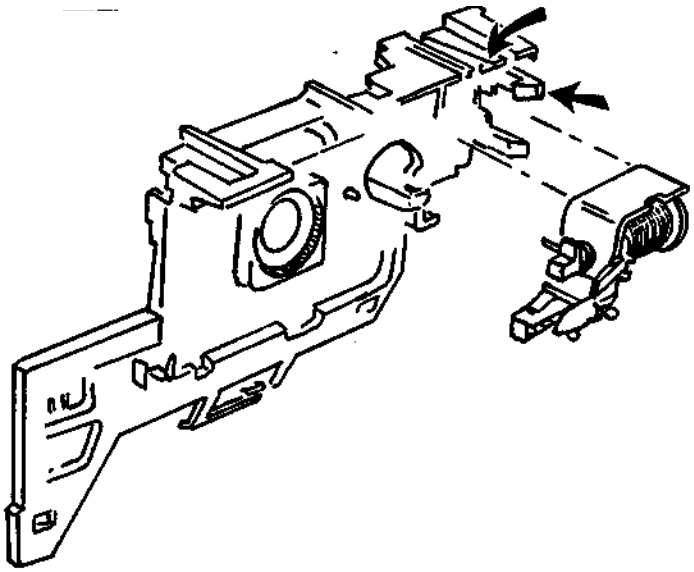

Fig. 26 Removing Solenoid & Plunger from Base Block

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Shutter Reassembly

31. Replace the Solenoid with its Plunger in place into the Base Block. The notch and guide pin on the Plunger yoke must face the rear of the Base Block (see Fig. 27), so that the yoke pin rides freely in the Base Block slot.

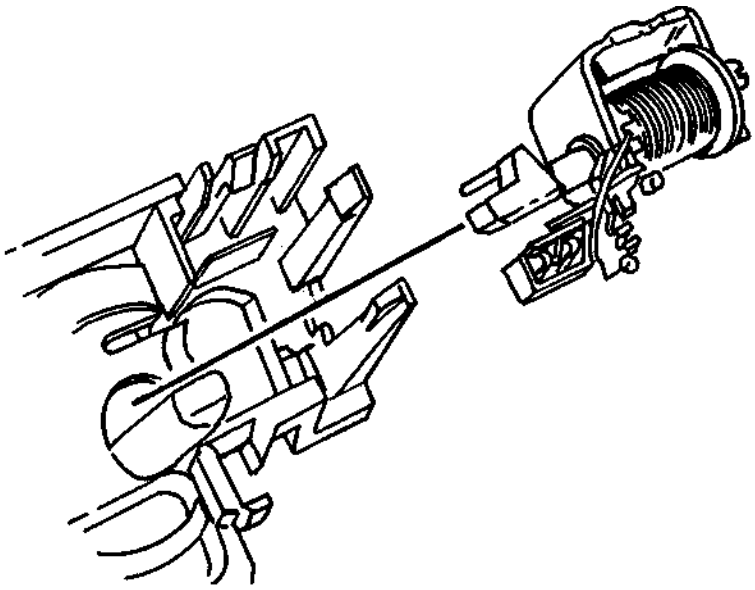

Fig. 27 Replacing Solenoid with plunger in Base Block

32. Replace the Flex on the Base Block by first slipping the attached photocell up under its retaining fingers on the Base Block (see Fig. 28). Now bow the Flex slightly, slip it under the Solenoid connector and down into position around the lens opening and guide pin. Fold the Flex leg up and reconnect it to the Solenoid.

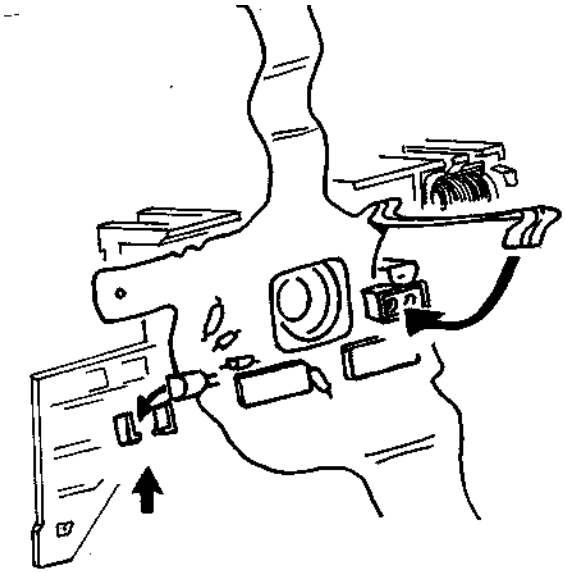

Fig. 28 Replacing the Flex on the Base Block

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33. Remount the Base Block on the Cone by positioning the two openings at the top of the Base Block over the corresponding projections on the Cone (see Fig. 29), then rotating the Base Block down into position until the locking tangs near the Counter Wheel and Motor snap shut.

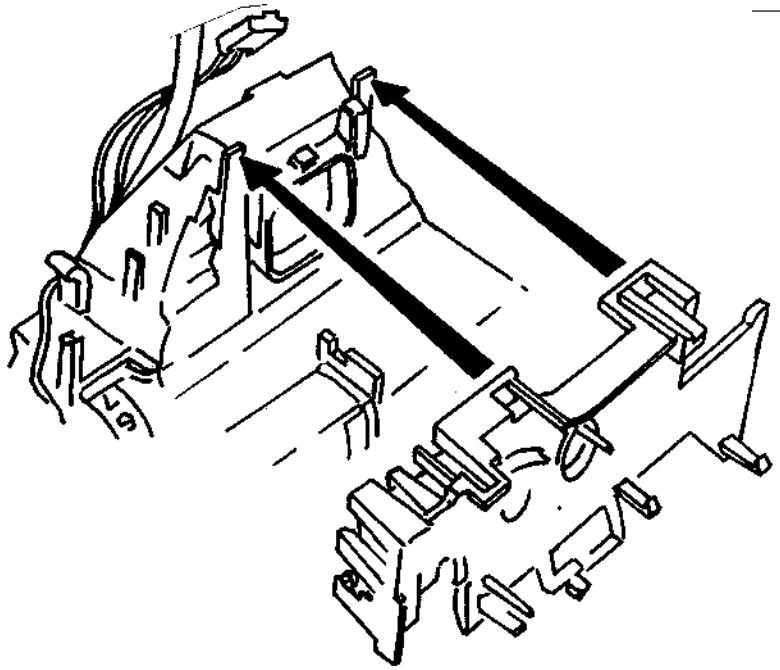

Fig. 29 Remounting Base Block on Cone

34. Reconnect the Flex to the Contact Support Block, Motor and Wire Block Assembly (see Fig. 30).

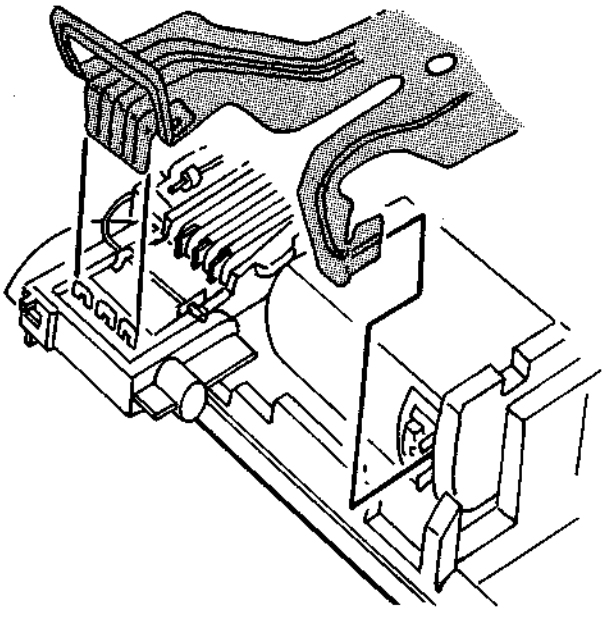

Fig. 30 Reconnecting Flex to Contact Support Block, Motor and Wire Block Assembly

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35. Reassemble the Shutter blades by inserting a dowel pin 3/32" x 3/4" (2.4 x 19 mm) in the hole in the Base Block shown in Fig. 31. Wearing finger cots or lintless gloves, install the bottom, middle and top Shutter Blades over the 3/32" dowel pin, and with the molded pin on Base Block projecting up through the slot in Blades (Fig. 31).

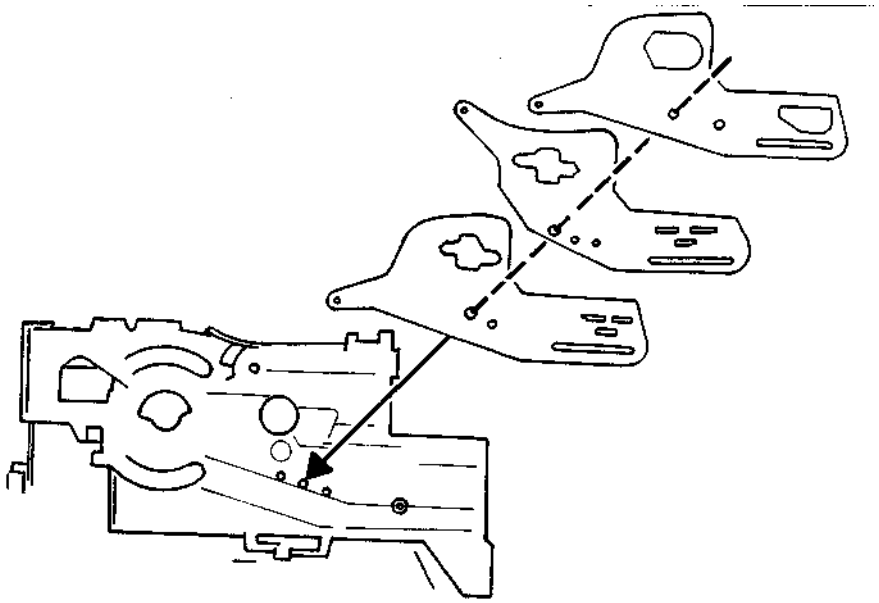

Fig. 31 Replacing the Shutter Blades

36. Mate the Inertia and Walking Beam together and install the Inertia Spring as shown in Fig. 32. Check that both parts pivot smoothly and are returned by spring action.

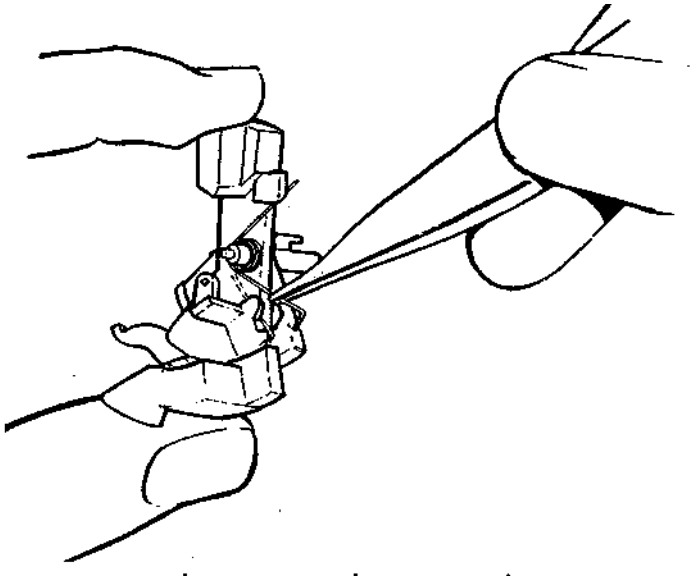

Fig. 32 Reassembling Inertia, Walking Beam & Spring

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37. Replace the Inertia and Walking Beam Assembly by engaging the four pins in the Blades, Solenoid Plunger Yoke and Base Block pivot point (see Fig. 33). Carefully remove the dowel pin and test Shutter Blade operation by moving the Walking Beam Assembly to produce an aperture.

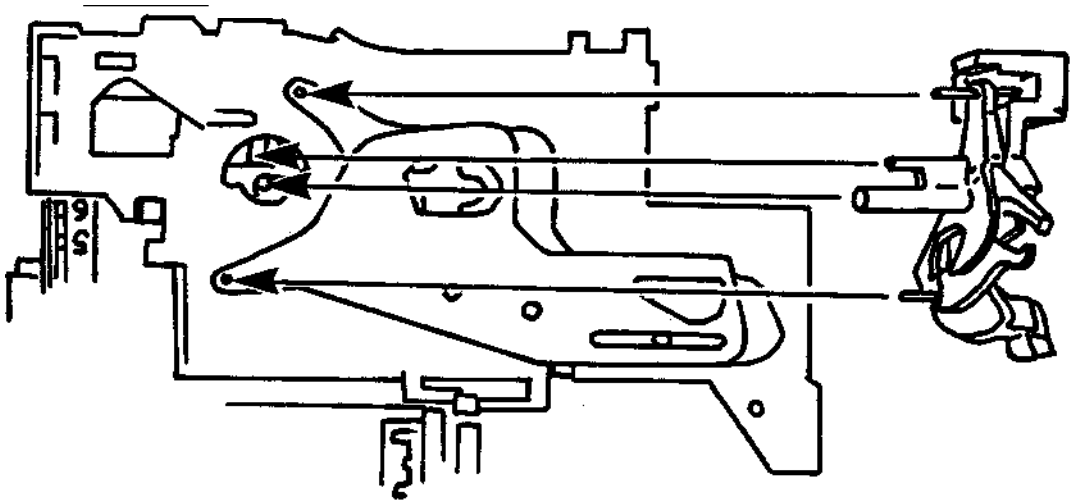

Fig. 33 Replacing Walking Beam/Inertia Assembly

38. Pivot the Inertia slightly to the right and slip the Shutter Latch down onto the pivot beneath the Inertia (Fig. 34). It must mate with the S5 Actuator.

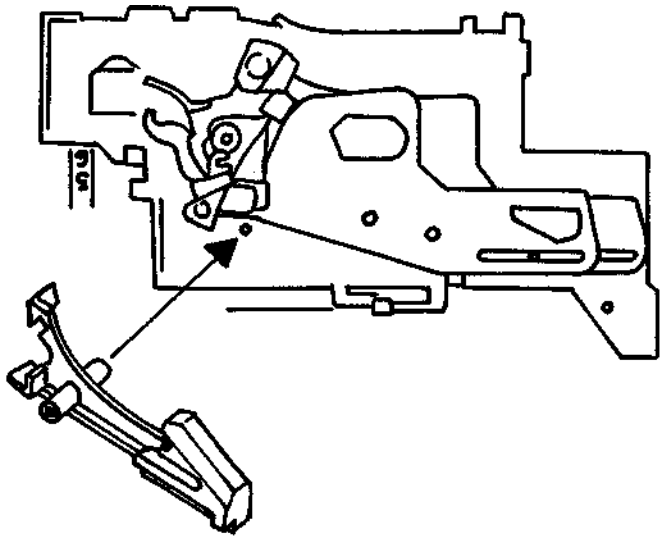

Fig. 34 Replacing the Shutter Latch

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39. Replace the Lens Mounting Plate by placing the two tabs at the top into their corresponding openings in the Base Block (Fig. 35). Tilt the Plate down- ward into position, making sure the Inertia pivot post enters its hole in the Base Block. Snap the three locking tangs closed at the bottom of the Plate.

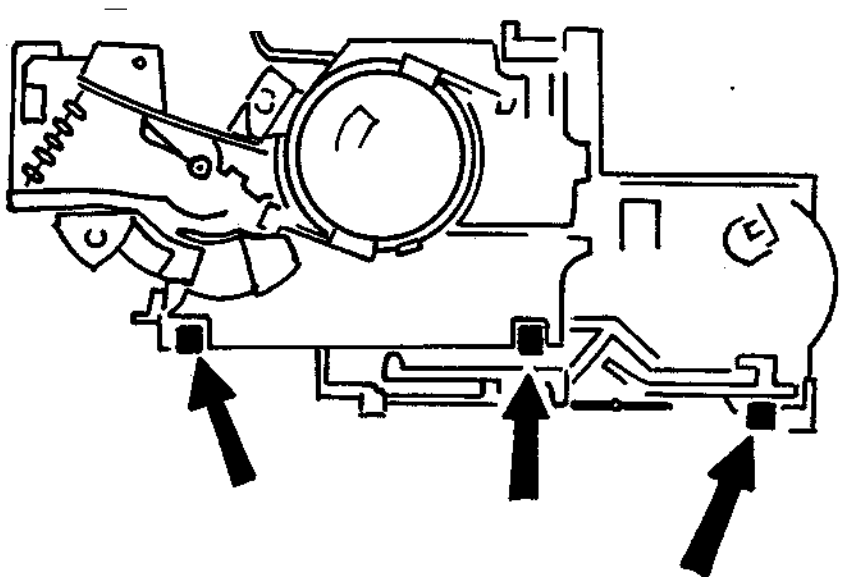

Fig. 35 Replacing the Lens Mounting Plate

40. Replace the Trim Slide in the Lens Mounting Plate by depressing the tang below it and sliding it into place (see Fig. 36).

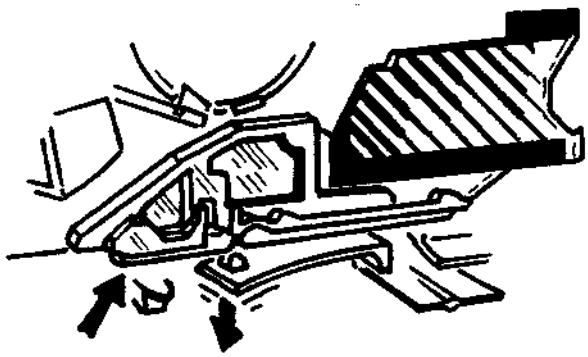

Fig. 36 Replacing Trim Slide

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41. Replace the photometrics in this order, as shown in Fig. 37: Ambient Lens Filter (green), Infrared Lens Filter, IR Calibration Wedge over the pivot on the IR Filter Lens, and the Ambient Calibration Disk with the stops on the bottom.

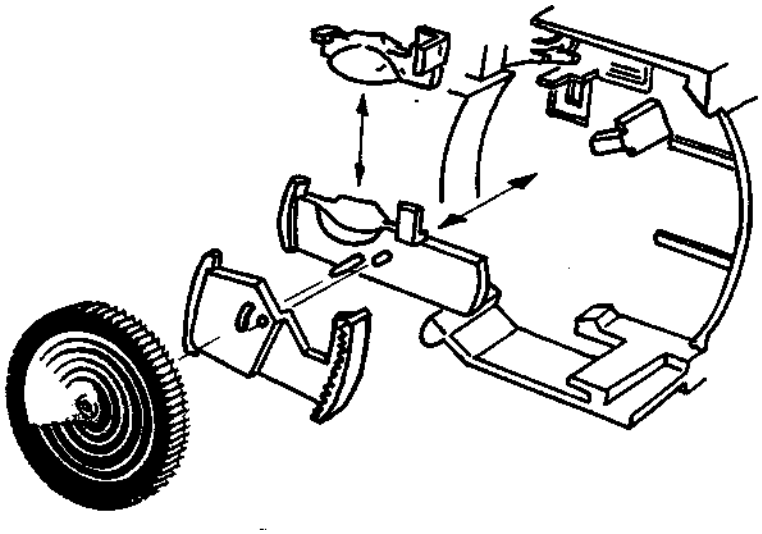

Fig. 37 Replacing photometrics on Lens Mounting Plate

42. Replace Opening Blade Spring with one end at the original (marked) rack position, the other end on the Walking Beam pin (Fig. 38). Test that the Shutter latches and unlatches properly.

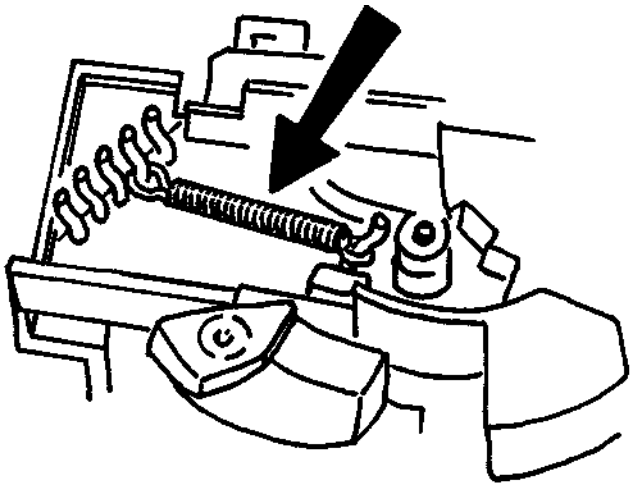

Fig. 38 Replacing Opening Blade Spring

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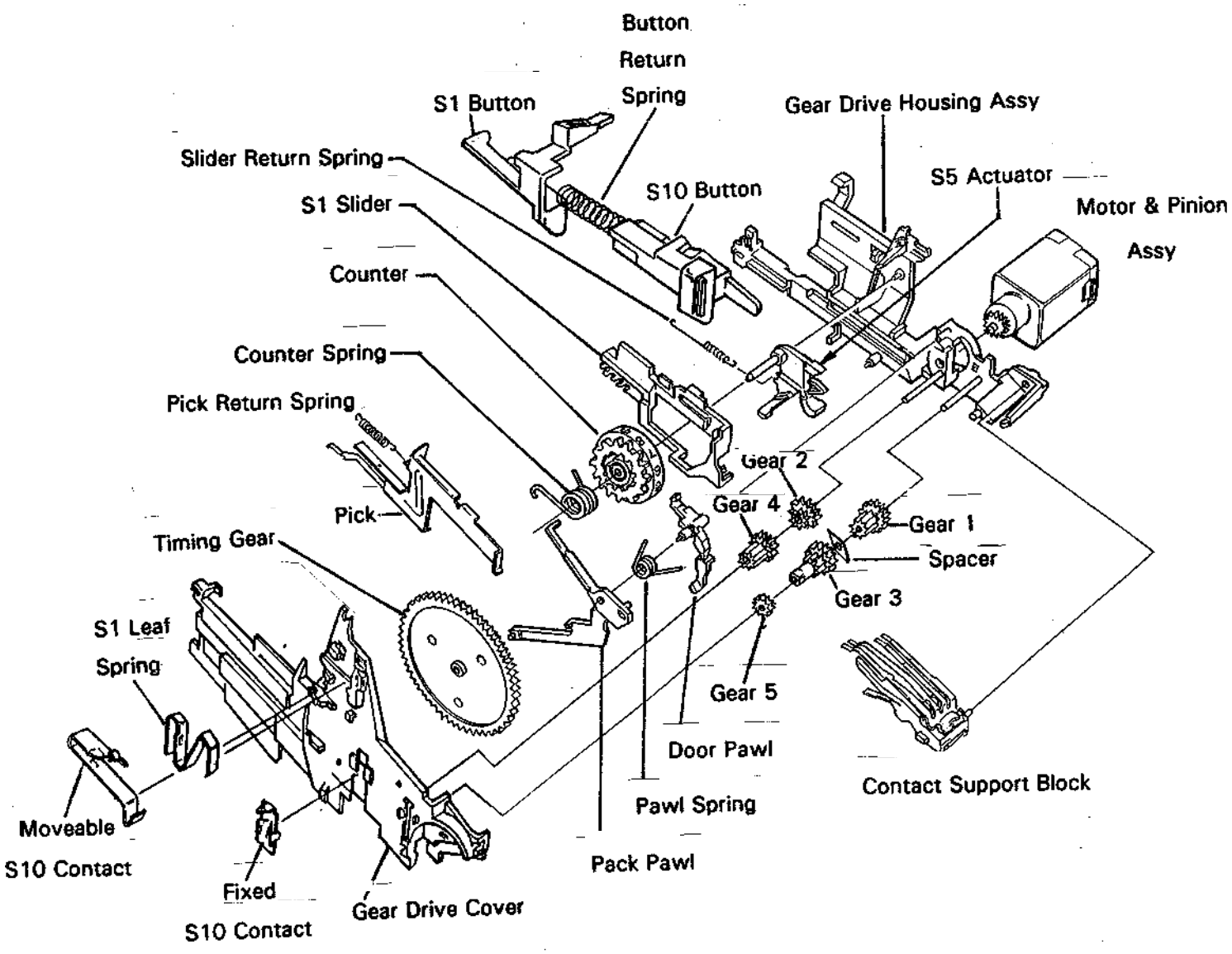
Drive Disassembly



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43. If necessary, remove the S1 Leaf Spring from the Gear Drive Cover by pulling it forward slightly and then lifting it up (see Fig. 39).

44. Disconnect the red jumper wire from the S10 movable contact by depressing the spring finger to release it (Fig. 39). Move the wire out of the way.

45. If necessary, remove the S10 movable contact.

46. Disconnect the bare (+) battery contact wire from the Contact Support Block and the S10 fixed contact by depressing the contact spring fingers. Free the wire from the Drive Cover and move it away.

47. If necessary to remove the S10 fixed contact, release the tangs holding the contact by inserting the pins on Tool 12536 into the two holes shown in Fig. 39. The contact can then be pushed out with a screwdriver.

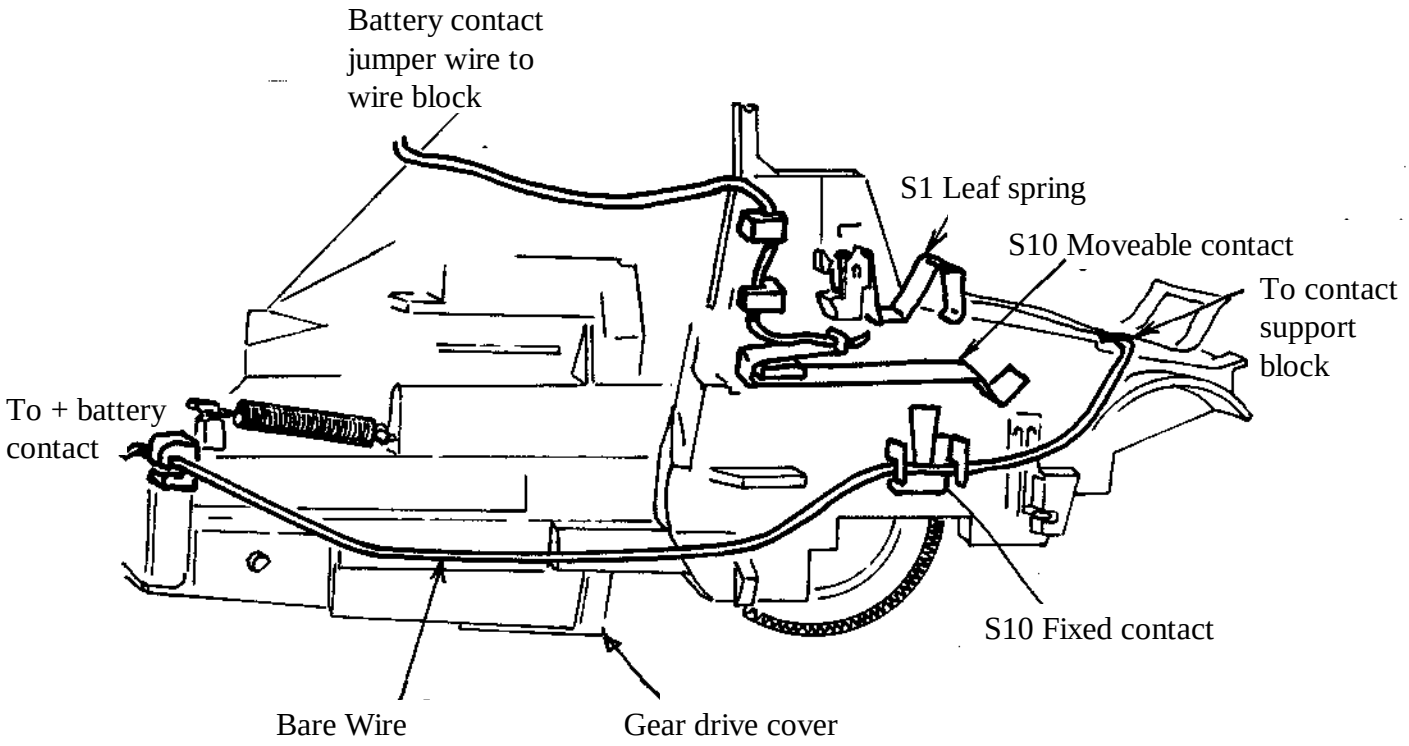

Fig. 39 Disconnecting wires and removing parts from the Gear Drive Cover

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48. Release the tension on the Counter and Pawl Springs (see insets A and B, Fig. 40).

49. Release the Drive Cover forward detent (inset C), the hanger detent (inset D) and the rear detent (inset E).

NOTE: In step 49, the metal gear (#5) may become dislodged. Be careful that it is not lost.

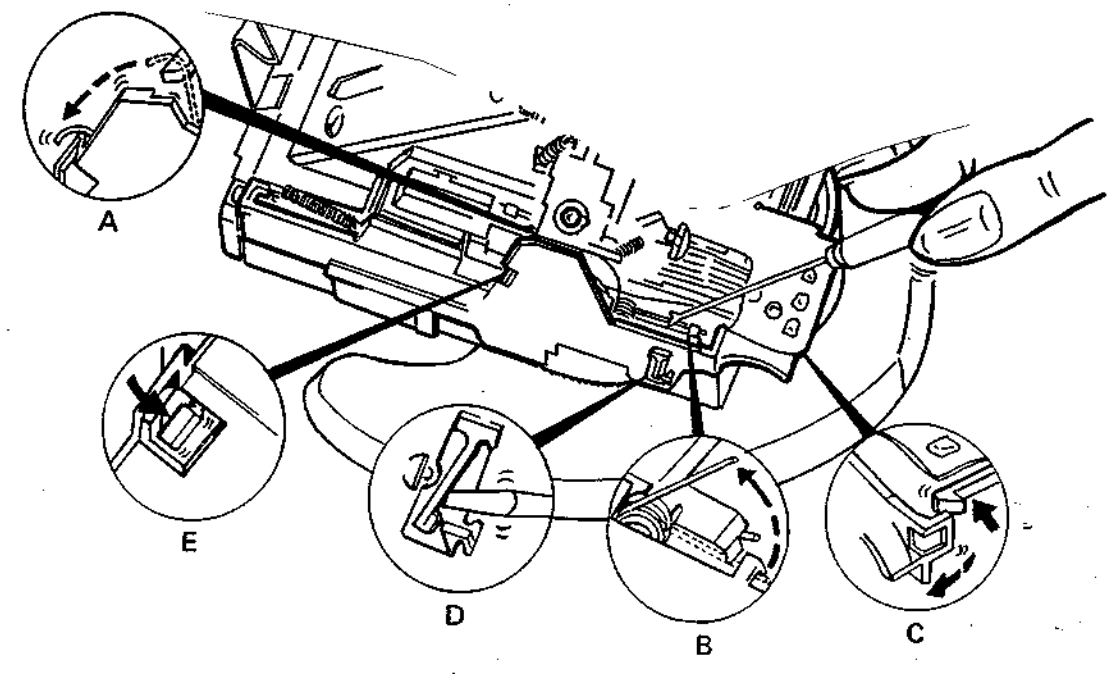

Fig. 40 Releasing springs and Gear Drive Cover detents

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50. Refer to Fig. 41: place your thumb over the left end of the Gear Drive. Slowly and carefully lift the right end of the Cover. Remove the Cover by walking the left end free of its detent. Use care to not break the detent.

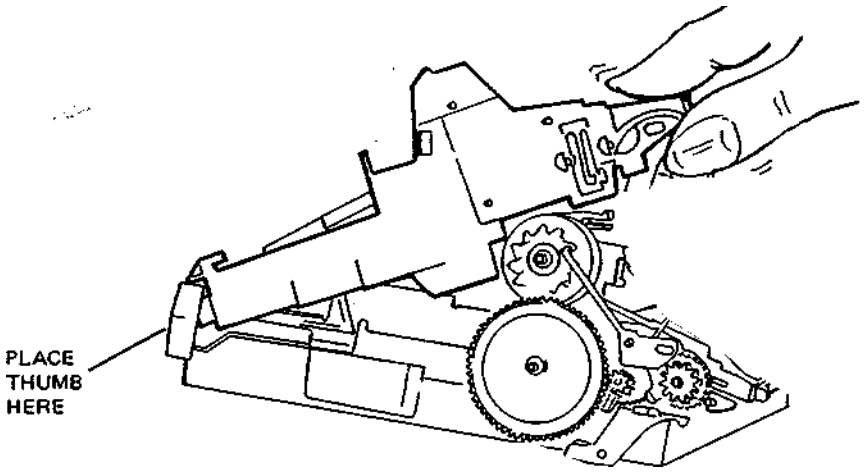

Fig. 41 Removing the Gear Drive Cover

51. Remove the Timing Gear, Pack Pawl, Pawl Spring, Door Pawl and, if not dislodged earlier, Gear 5.

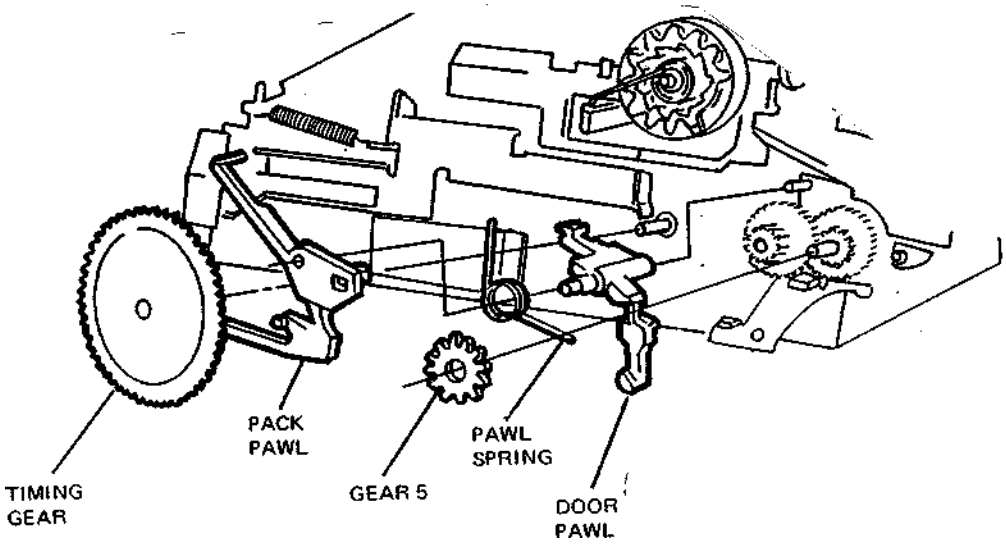

Fig. 42 Parts removal from Gear Drive

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52. Remove the Counter and Counter Spring by pulling the Counter off its shaft (Fig. 43).

Remove the four remaining Gears and the Spacer from their shafts (Fig. 43).

Release the back end of the Pick Return Spring and slide the Pick forward. Lift both parts free of the Cone Assembly (Fig. 43)

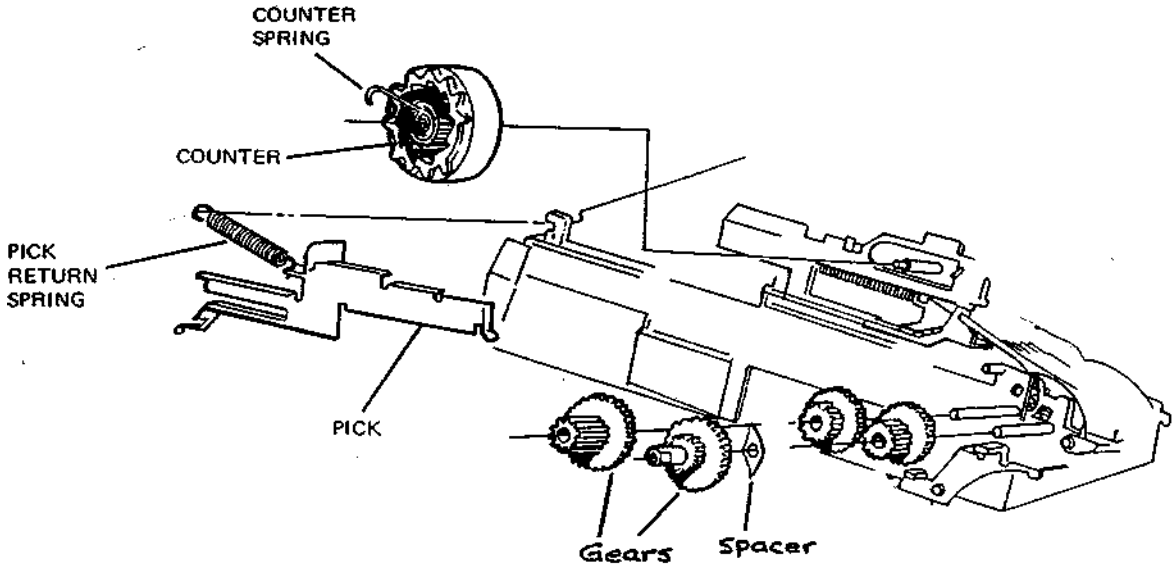

Fig. 43 Removing the Counter, Gears & Pick

53. Push the Slider in as shown in Fig. 44 inset. Push in detent and the Contact Support Block will pop out. Let it hang from the Flex, if Flex has not already been removed.

Pull the S1 Slider and S5 Actuator free of the Cone (Fig. 44). Disassemble Slider components.

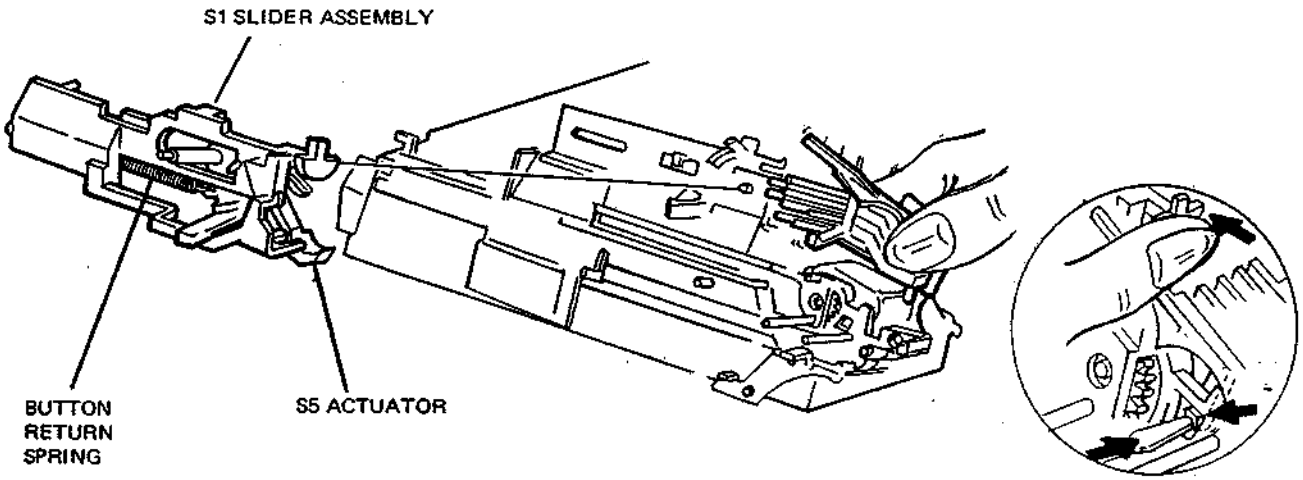

Fig. 44 Removing S1 Slider and S5 Actuator

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Drive Reassembly

54. Install the S5 Actuator on the Slider. Hold them together while installing them on the Cone.

55. Install the Slider Assembly over the pivot on the housing (Fig. 45). Be sure the tip of the S5 Actuator is over the Shutter Latch (see Fig. 45).

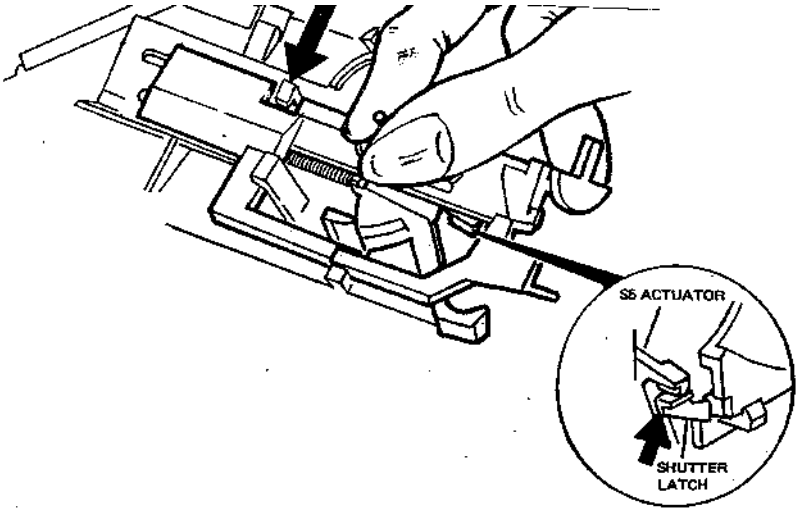

Fig. 45 Replacing Actuator and Slider Assembly

56. Push the Slider back and position the Contact Support Block onto the housing (see Fig. 46). Before snapping detents closed, be sure that the lower S1 contact is positioned between the Slider fingers. Snap detents closed and release Slider.

Verify that Slider moves freely and Slider fingers and switch contacts are properly positioned.

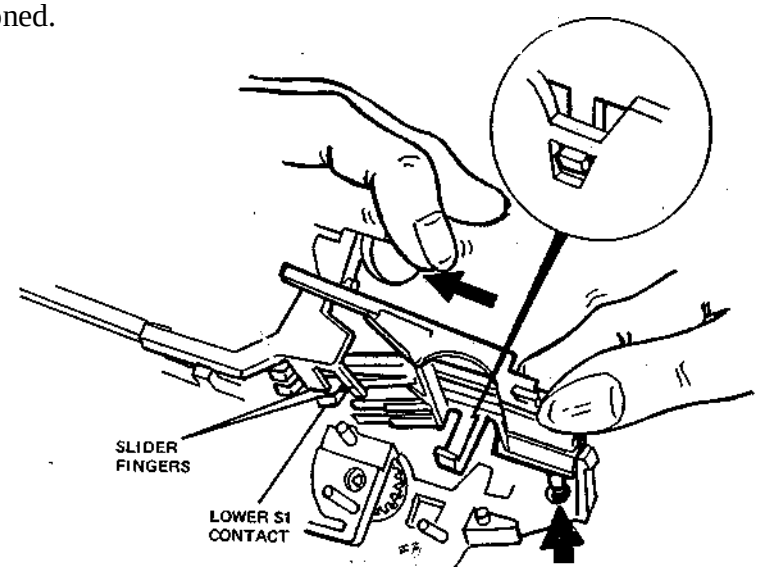

Fig. 46 Verifying Slider-Switch contact relationship

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57. Using Fig. 47 as a guide, replace the four plastic gears, metal gear #5 and the spacer.

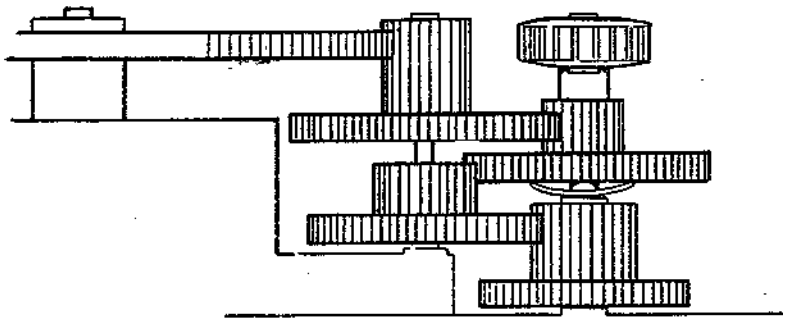

Fig. 47 Gear placement guide

58. Referring to Fig. 48, replace the Door Pawl and Pawl Spring.

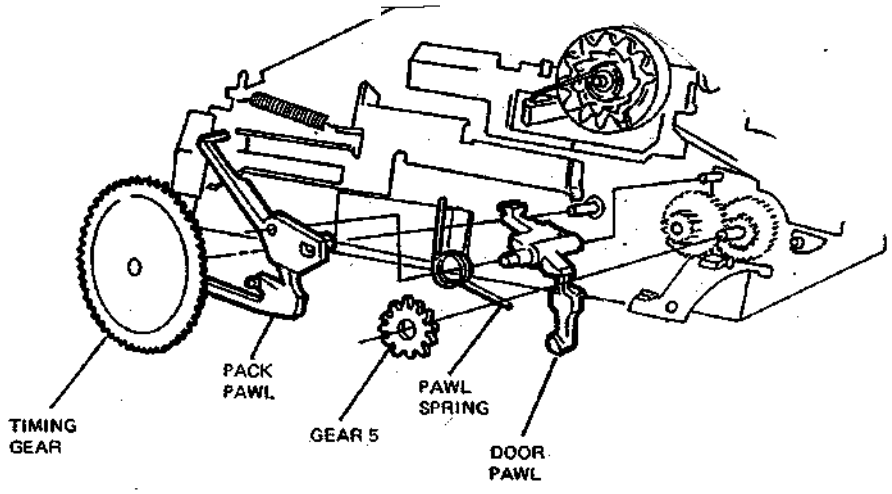

Fig. 48 Replacing Door Pawl and Spring

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59. Set the Counter Spring into the Counter (Fig. 49), wind the Spring, push in the Slider and place the Counter on its shaft. Temporarily hook the Spring onto the lower detent. (Note that the number 6 is upside down and facing forward.)

Release the Slider: the Counter should lock into place and the number 7 drop so it is facing forward (upside down).

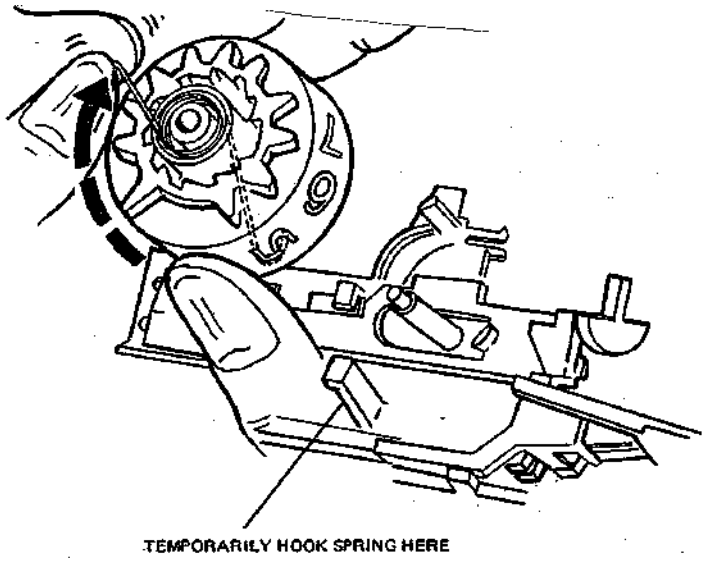

Fig. 49 Replacing the Counter

60. Install the Pack Pawl in the position shown in Fig. 48.

61. Install the Pick, with Return Spring attached, as shown in Fig. 50. Attach Spring to housing and be sure Pick slides freely.

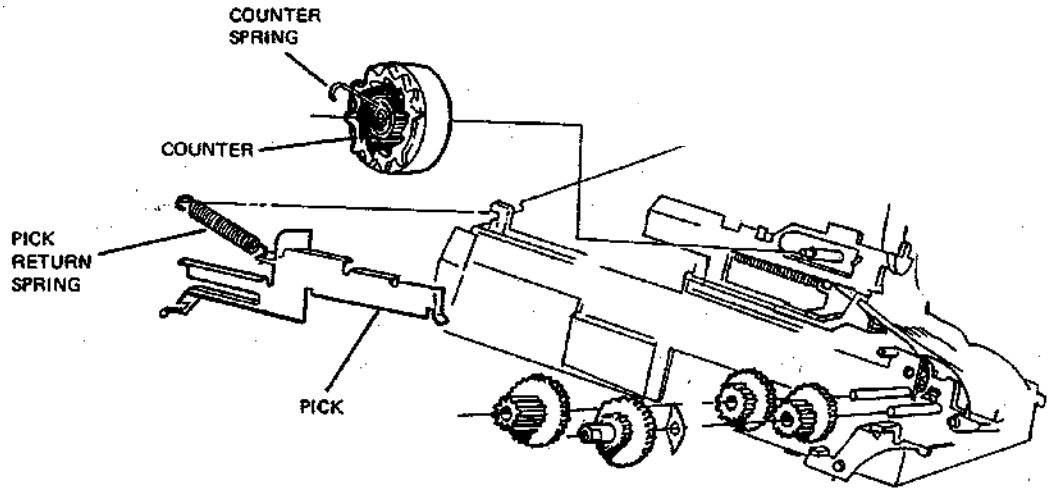

Fig. 50 Replacing Pick and Return Spring

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62. Install the Timing Gear on its shaft (Fig. 51). It may be installed in any position as long as none of its cams interfere with the motion of the Pick. (The camera will time itself in its first cycle.)

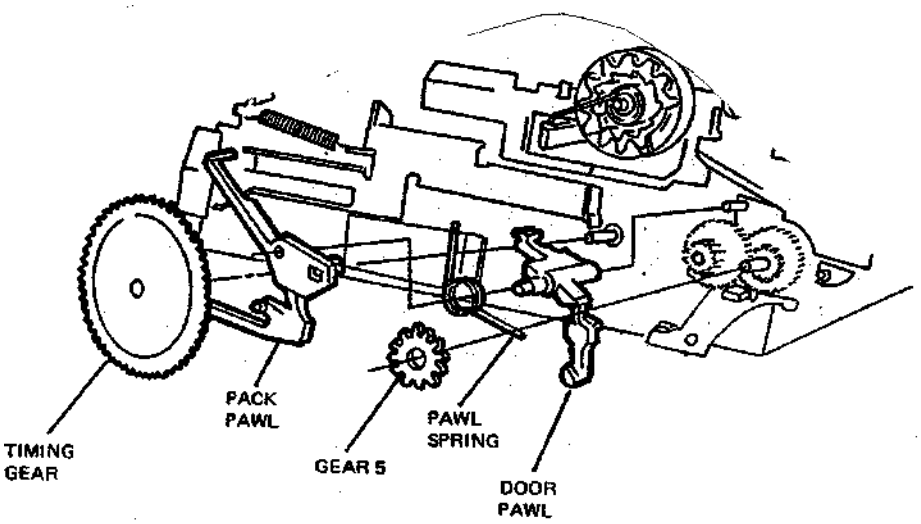

Fig. 51 Replacing the Timing Gear

63. Replace the Gear Drive Cover (see Fig. 41), carefully maneuvering it into place to prevent breaking the rear (left end) detent. Snap-in the forward detent first, then the hanger detent, finally the rear detent.

64. Using a dental pick, set the Counter Spring and Pawl Spring as shown in Fig. 52.

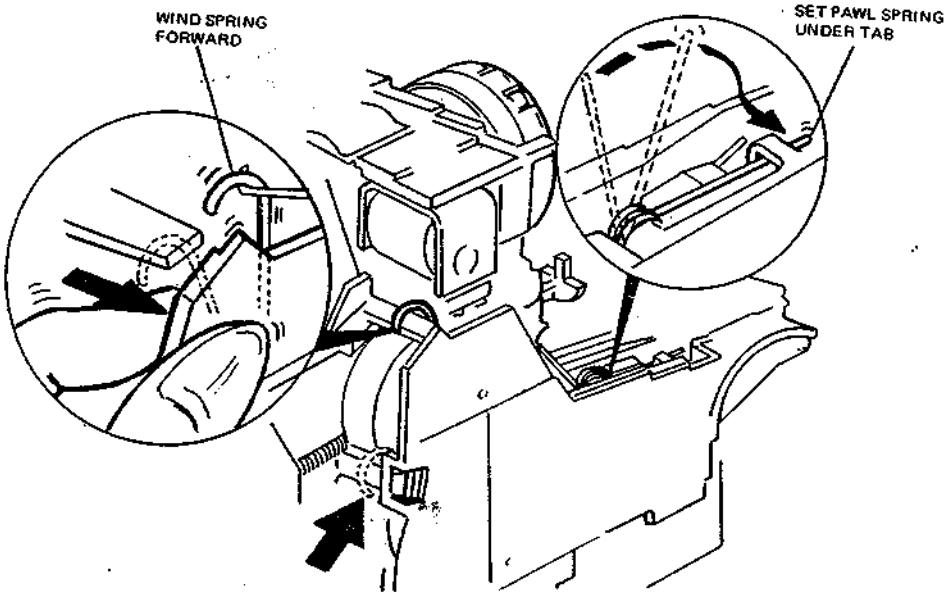

Fig. 52 Setting Counter and Pawl Springs

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65. Replace any Contacts and parts removed from the Gear Drive Cover in steps 43 - 47. Reconnect the (+) battery wire to the S10 fixed contact and the Contact Support Block, and the red jumper wire to the S10 movable contact (see Fig. 53).

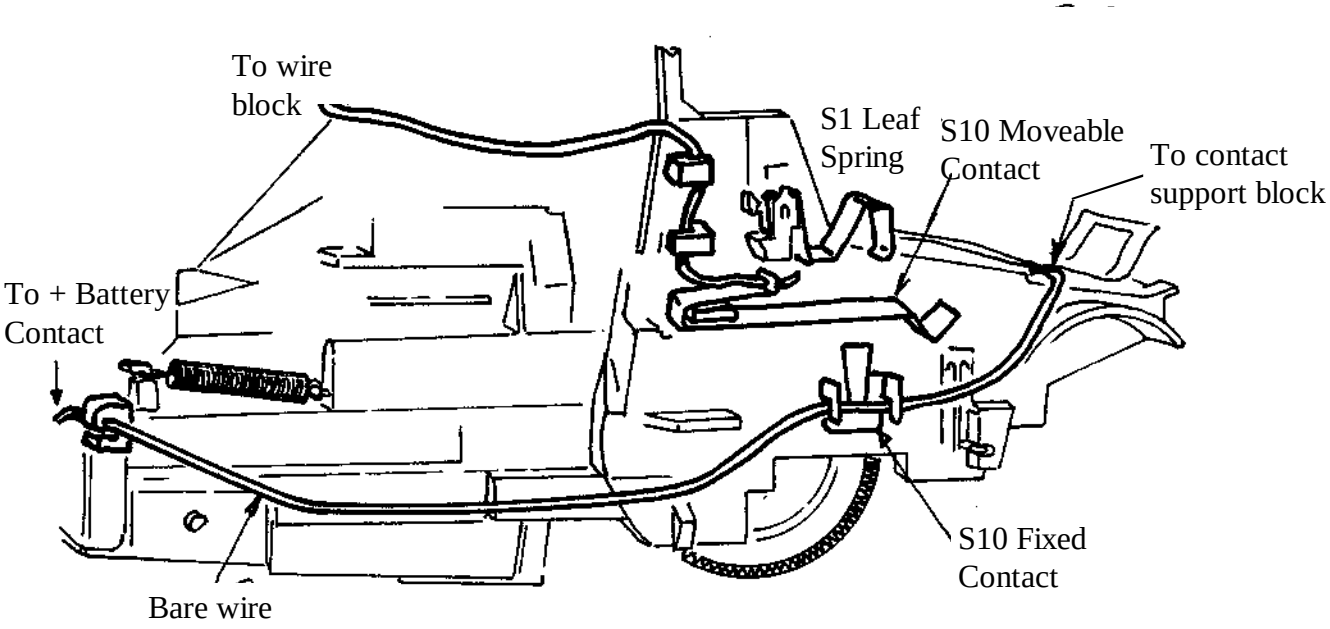

Fig. 53 Reconnecting wiring to contacts

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Door and Spread System Disassembly

66. Remove the Door Assembly by disengaging the hinge on the right side (opposite gears), then the hinge on the left side.

67. Remove the Spread System Assembly by inserting an Exacto knife with a #11 blade just below the lower leg of the spring, on the left (non-gear) side (see Fig. 54). Keep the blade flat, in the same plane as the rollers, with the dull edge against the end plate. The tip of the blade should be halfway between the front and rear legs of the spring.

68. Swing the knife handle to the right a little so the tip of the blade pushes to the left, against the inside of the end plate (Fig. 54). This will unlock the hidden detent in the left end plate from its channel in the door, allowing the left end of the Spread System to be pulled out slightly. **Use care: detent will break off if deflected too far.**

69. Repeat the process on the right (gear) side, gently pushing the tip of the blade to the right slightly, releasing the detent in the right end plate from the door channel. Now remove the Spread System Assembly.

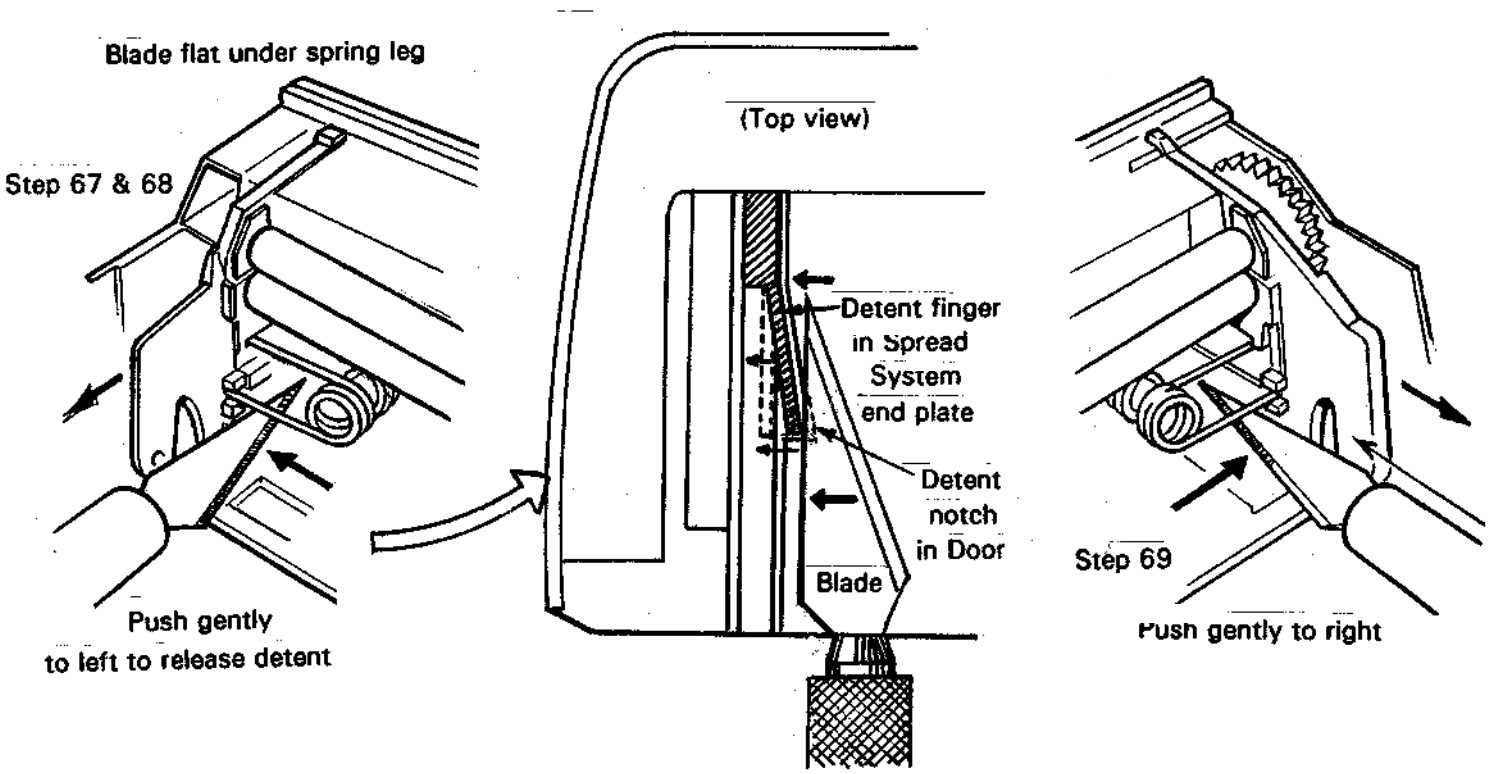

Fig. 54 Removing the Spread System from the Door

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To complete the reassembly of the Camera:

67. Replace the Viewfinder on the Cone

68. Replace the Cone into the Body

69. Replace the S1 and S10 Buttons

70. Replace the Release Button

71. Replace the Apron to retain the Release Button

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SECTION 5 - MODEL 636 CAMERA TROUBLESHOOTING

Introduction

Before performing the troubleshooting procedures presented in this section, you should be thoroughly familiar with the Theory/Sequence portion of this manual. Quite obviously you must know how the 636 Camera works before you can start to diagnose its problems.

Initial Inspection

The following procedure should be done before you get involved in an operational check of the 636 Camera. Before long, you will find this procedure becomes automatic and you will no longer have to refer to it for step-by-step guidance.

1. Visual

a. Inspect the camera for obvious faults such as gaps between body parts; and missing, broken, distorted, scratched or otherwise defective parts. Pay particular attention to lens, viewfinder and flash shield components for signs of smudges and foreign matter. Examine the camera for cosmetic defects which are beyond allowable standards.

b. Look into the lens. The shutter blades should be closed.

c. Look at the Counter window. With no film in the Camera the window should be blank, indicating that the Counter has reset.

2. Pre-Operational

a. With the strobe closed, press the S10 button. It should not move, being held out by the interlock tab on the strobe housing.

b. Erect and then close the strobe. It should move through its entire travel freely with no binding. Also, when the strobe is erected and the camera is tilted forward, the strobe should not fall forward.

c. Move the lighten/darken control tab from full-light to full-dark and then back to its nominal detent position. It should move freely with no binding during its travel.

d. Press the front door release button. It should offer some resistance to thumb pressure. At the forward end of its travel, the release button should drop the front door open. Close the front door to be certain it latches properly.

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e. Press the S10/S1 buttons through their entire travel. They should move smoothly with no binding.

f. With the front door open, look into the film compartment. Check the following:

- Pack spring and battery contacts are not distorted.

- Taking mirror is not broken, loose or scratched.

- Spread roll bracket assembly components are OK and rollers move freely.

- Spread rollers are clean.

- With pick height gauge #12430 or #12504 (see P.A. SX-70 #291) see that the pick is positioned correctly.

- No foreign material in film cavity.

- Hanger is in proper position.

- Pack pawl leg is in a down position and not distorted.

- Cone filler #550851A is in position or cone has molded fix (See RIB 600AM #6).

3. Functional Test

Perform the following functional test on the 636 camera using film pack simulator #12467 (.3 ohms) and power supply Power Mate #12531 or Lambda #12429.

1. Setup

a. Plug the film pack simulator into the power supply. Be sure the polarity is correct.

b. Plug the power supply into a 110 VAC source.

c. Turn the power supply switch ON.

d. Adjust the output voltage to 6.0 volts.

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2. Test

a. Open the front door of the camera and install the film pack simulator. The camera should not cycle.

b. Remove the film pack simulator and install door pawl closure #12082.

c. Install the film pack simulator again:

- The camera should go through the dark slide cycle.

- The shutter blades should remain closed.

- The strobe should not charge (green LED off)

- The counter should go from blank to #10.

d. Depress the S10 Button lightly so that it just touches the S1 Button.

- Four to six seconds later, the green LED should light, indicating strobe is charged. LED stays on about 30 seconds.

- Depress S10/S1 Buttons fully: the strobe should fire.

- Repeat step d. four more times.

e. Cover the photocell with black photographic tape and turn the Camera to face you.

- Depress the S1 Button only: the blades should open to a small aperture (f/20) and then close.

- Repeat the step above four times.

- Remove the tape from the photocell.

f. Depress the Sl0/S1 buttons fully:

- the camera will not cycle (Empty Pack Lockout).

- the strobe will charge.

- the green LED will light in 4 - 6 seconds.

- the strobe will not fire.

- the counter window will be blank.

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g. Remove the film pack simulator and door pawl closure:

- the counter will return to its starting position.

h. Insert a known good film pack with film into the camera. Take a 2-foot cyan background picture with strobe:

- observe that the film transport and delivery systems are functioning properly.

- observe the finished picture for complete coverage.

- observe the finished picture for evidence of dirt or cracks on the taking mirror.

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TROUBLESHOOTING CHARTS

(NOTE: Also see the RIB and Product Alert listing following these charts)

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Dark Slide Cycle with Front Door Open (Non-Continuous) (If cycling continuously go to Continuous Cycling chart)	1. Door pawl spring defective or not loaded under pack pawl.	1. Replace spring or load spring properly.
	2. S1 slider fingers and switches on contact support block not interfaced properly.	2. Disassemble and install properly
	3. S1 switch contacts deformed. (Closed with front door open - check with meter).	3. Re-form S1 contacts if possible. Replace contact support block if necessary.
	4. Contact support block defective.	4. Replace contact support block.
No Dark Slide Cycle	1. S9 switch open (check with meter). support block if necessary.	1. Re-form S-9 switch contacts. Replace
	2. S1 slider fingers and switches on contact support block not interfaced properly.	2. Disassemble and install properly.
	3. S1 slider cam not mated to counter properly.	3. Disassemble and install properly.
	4. S1 switch contacts deformed (closed with front door open - check with meter).	4. Re-form S1 contacts if possible. Replace contact support block if necessary.
	5. Contact support block defective.	5. Replace contact support block.
	6. Battery (+) wire not trapped in contact support block properly.	6. Install battery wire properly.
	7. Flex circuit motor contacts not seated properly.	7. Install flex motor contacts properly.
	8. Counter spring defective or not loaded properly.	8. Repair or replace spring.

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PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
No Dark Slide Cycle (cont'd)	9. Battery contact height marginal or not seated properly.	9. Replace battery contacts.
	10. Flex circuit defective.	10. Replace flex circuit
No S1 response	1. Defective S-1 button or S-l slider.	1. Replace S1 button or S1 slider.
	2. S1 slider and contact support block not interfaced properly.	2. Disassemble and install properly.
	3. S1 switch contacts de-formed (do not close).	3. Re-form S-1 contacts or replace contact support block if necessary.
	4. Poor connection between flex circuit and solenoid.	4. Check connection and correct problem.
	5. S9 is closed (check with meter). NOTE: In this failure, camera will cycle but blades remain closed.	5. Re-form S-9 contacts or replace contact support block, if necessary.
	6. Solenoid defective (should read 2 to 3 ohms).	6. Replace solenoid.
Continuous Cycle (Camera ejects film continuously)	1. Pack pawl override	1. See RIB #600AM 6.
	2. Solenoid gap incorrect.	2. Adjust solenoid gap.
	3. Shutter blades binding: a. Foreign matter on blades. b. Blades distorted. c. Blades not attached to walking beam.	3. Repair or replace blades as necessary.
	4. Blade guide pin in shutter baseblock broken	4. Replace shutter baseblock.
	5. Shutter latch binding.	5. Correct cause of binding.
	6. Solenoid plunger sticky.	6. Repair/replace solenoid.

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PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Continuous Cycle (cont'd.)	7. Counter spring unwound or not trapped in counter properly	7. Install counter spring correctly
	8. S-1 slider cam interface with counter not correct	8. Install S1 slider cam properly.
	9. S5 P&L contacts under S5 actuator.	9. Disassemble and install properly.
	10. Shutter assembly not seated in cone properly.	10. Disassemble and install properly making certain interface with drive is OK.
	11. Flex circuit defective.	11. Replace flex.
Continuous Cycle (Camera runs but does not eject film)	1. Stripped teeth on timing gear.	1. Replace timing gear.
	2. 5th gear missing or not in position.	2. Repair or replace.
Mid-Cycle Failure	1. Solenoid gap incorrect.	1. Adjust solenoid gap.
	2. Battery (+) wire not properly seated in contact support block or in solderless battery contact.	2. Examine battery wire.
	3. Blades binding.	3. Examine blades & repair or replace as necessary
	4. Battery contact height marginal or not seated properly.	4. Replace battery contacts.
	5. Contact support block defective.	5. Replace contact support block.
	6. Solenoid defective.	6. Replace solenoid.
	7. Flex circuit defective.	7. Replace flex circuit.

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PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
High Current Drain	NOTE: First determine whether problem is with strobe or camera. Replace strobe with known good test strobe. If operation is OK with test strobe, problem is in original strobe which must be replaced. If operation reveals high current drain with good test strobe, problem is in camera. Continue below:	
	1. Switch contacts on block are distorted.	1. Re-form contacts or replace contact support block as necessary.
	2. Contact support block defective.	2. Replace contact support block.
	3. Flex circuit defective.	3. Replace flex circuit.
Strobe Failures: No Flash No Charge LED stays on	NOTE: First determine whether the problem is with the strobe or the camera. Replace the strobe with a known good test strobe. If operation is OK with test strobe, the problem is with the original strobe which must be replaced. If operation reveals problems with good test strobe, problem is in camera. Continue below:	
	1. SlO button and movable SlO contact interface incorrect.	1. Assemble camera properly.
	2. SlO contact distorted.	2. Re-form contact.
	3. SlO jumper wire not trapped in movable contact or wire block properly.	3. Install jumper wire properly.
	4. Bare (+) wire not trapped in fixed SlO contact properly.	4. Install (+) wire properly.
	5. Flex circuit not installed into PC board properly.	5. Install flex properly.
	NOTE: Use meter to check continuity between points.	

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PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
LED does not light	NOTE: If strobe does not function, see Strobe Failures. 1. LED shorted at PC board. 2. LED not installed properly on PC board. 3. LED defective. 4. Flex circuit defective. 5. Strobe PC board defective. 6. Film battery dead/film pack absent.	1. Correct short. 2. Install LED properly. 3. Replace LED/PC board. 4. Replace flex. 5. Replace strobe. 6. Insert fresh film pack.
Light leaks in picture	1. Light seal on cone missing. 2. Baseblock photographic tape light seal missing. 3. Mirror cover light seal not positioned properly. 4. Film pack spring defective.	1. Install cone light seal. 2. Install photographic tape on baseblock. 3. Install mirror cover light seal properly. 4. Replace pack spring.
Close-Up Lens Does Not Function Properly	1. Lens return spring missing or out of position. 2. Shuttle binding in apron guide rails. 3. Close-up lens not riding in apron rails properly. 4. Return spring tab broken.	1. Install spring properly. 2. Install shuttle properly. 3. Install lens properly. 4. Replace lens panel.

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Additional 600-line Camera Troubleshooting help from Product Alerts and RIBs

NOTE: Many of the problems and fixes described below were temporary solutions, later permanently corrected by design/manufacturing changes. Thus the repair material described below may or may not be present in or applicable to a later version of the camera.

Subject	Bulletin #	Date
Troubleshooting Update — 600 line cameras	600AM #46	3/36/84
Exposure Flex Photocell movement Trapped Shuttle in CU lens Continuous cycle from angled film pack	600AM #92-35	10/27/92
Strobe LEDs: red only; red & green; green only	600AM #83	10/31/87
Hybrid 2-LED Strobe PC Boards	600AM #92-22	3/26/92
Low-cost, one green LED Strobe	600AM #91-17	12/16/91
No strobe charge from dirty S10 contacts	600AM #48	5/2/84
Black/dark pictures from light leaks to photodiode	600AM #93-40	1/18/93
Black pictures from light leak behind strobe	600AM #95-45	7/9/95
Streaked pictures from apron light leaks	600AM #78	8/13/87
Continuous cycling from Contact Support Block	600AM #91-16	12/16/91
Release Button-Door Latch clearance problem	600AM #91-6	5/28/91
Oxidation on flex circuit solder pads	600AM #96	12/11/89

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SECTION 6 — 636 CAMERA TESTING WITH THE STAR TESTER

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A. Test Specifications for Model 636 Camera

Test:	Specification:
Flash Timing	2.0 to 13.0 ms
Ambient Exposure	-0.30 to +0.10
Strobe Exposure (Graywall)	0.0 to -0.50
ZLS Output	260 to 400 ZLS
Charge Time (2nd cycle)	4 sec. max
Energy Draw (2nd cycle)	12.5 amp sec.

B. Graywall Preparation

1. The target should be constructed of a flat hard board material such as Masonite. It must be a minimum size of 4 ft. x 4 ft. (1.2 m x 1.2 m).

2. Prepare the surface by applying a primer coat of flat white latex paint. The surface must have a uniform white appearance when dry. If necessary, use two coats of flat white latex paint to achieve uniform coverage. Allow 24 hours for the primer to dry.

3. After the primer has dried, apply two coats of special gray paint which has been provided. The two coats must be applied in opposite directions. For example, apply the first coat in an up and down direction and the second coat in a left and right direction. Allow plenty of drying time between the two coats. The amount of drying time is dependent on temperature and humidity.

4. Choose a suitable location for the testing area. The following conditions must be met:

    a. The testing area must be located where lighting on the graywall target will remain below 10 candles/square foot. Most room lighting meets this requirement. Avoid areas where outside light shining through a window can strike the target resulting in erroneous strobe exposure readings.

    b. Select an area where the graywall target can be secured to a wall which is perfectly flat. The area must be large enough to allow the testing equipment to be placed 4.5 feet (137cm) from the target (see Figure 1). The area must be free of any obstacles between the camera under test and the graywall.

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5. Secure the graywall target to the wall and set up the test equipment as instructed in the setup procedures. The center of the target must be aligned with the taking lens of the camera under test.

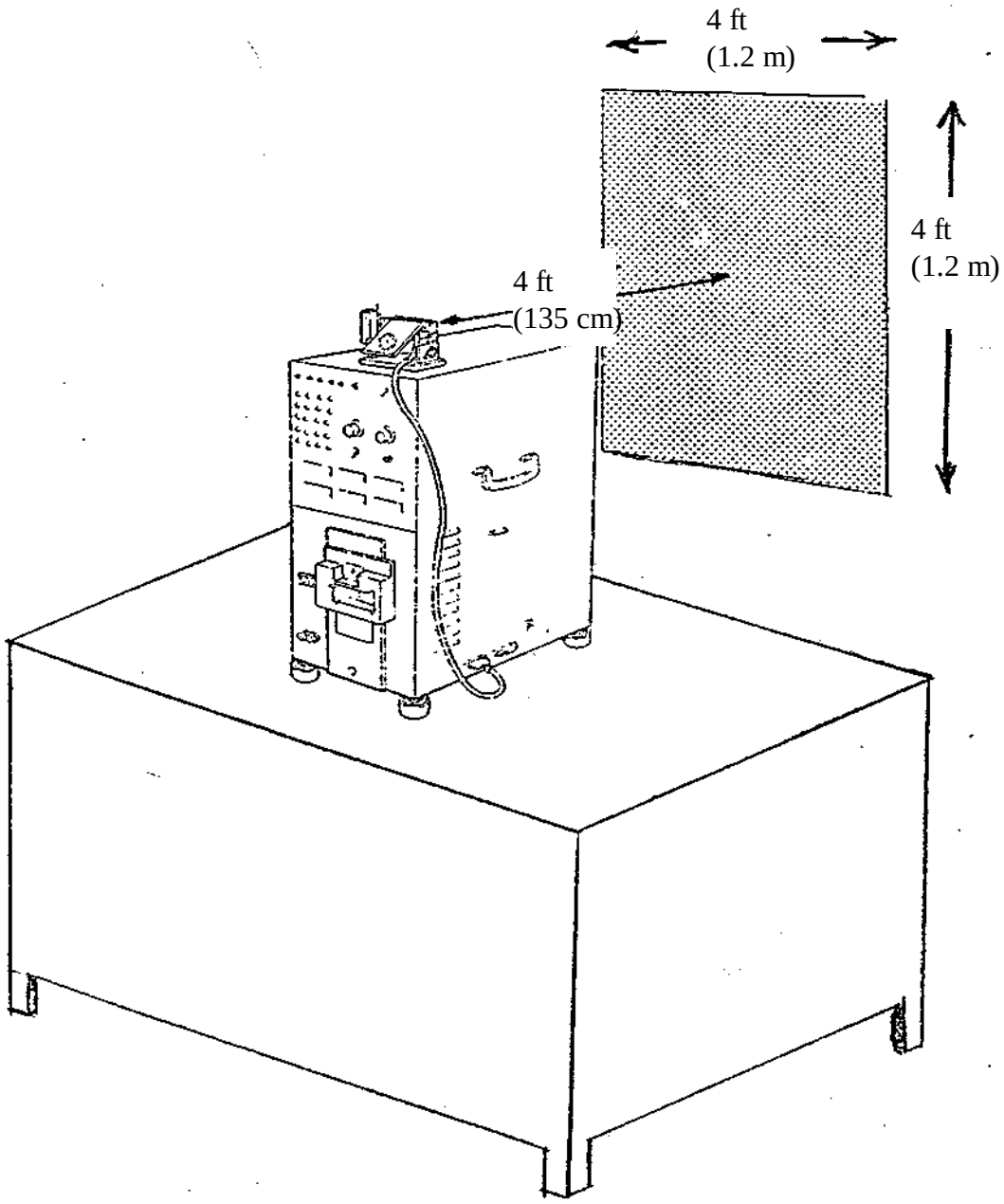

Fig. 1 Graywall setup

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C. Setting up the Model 12650-2 Star Tester

1. Install the Star Tester on a level surface with sufficient clearance to allow proper air flow for the cooling fan and exhaust vents. Also, the tester work surface should be located so the various fixtures can be located 4.5 feet (137 cm) from a graywall target.

2. Insert a <u>modified</u> strobe fixture #12657B (see inset, Fig. 2) into two openings on the tester (Fig. 2). (For details of this modified fixture, see Product Alert 600AM #92-30, dated 7/31/92.) Be certain the fixture is fully seated.

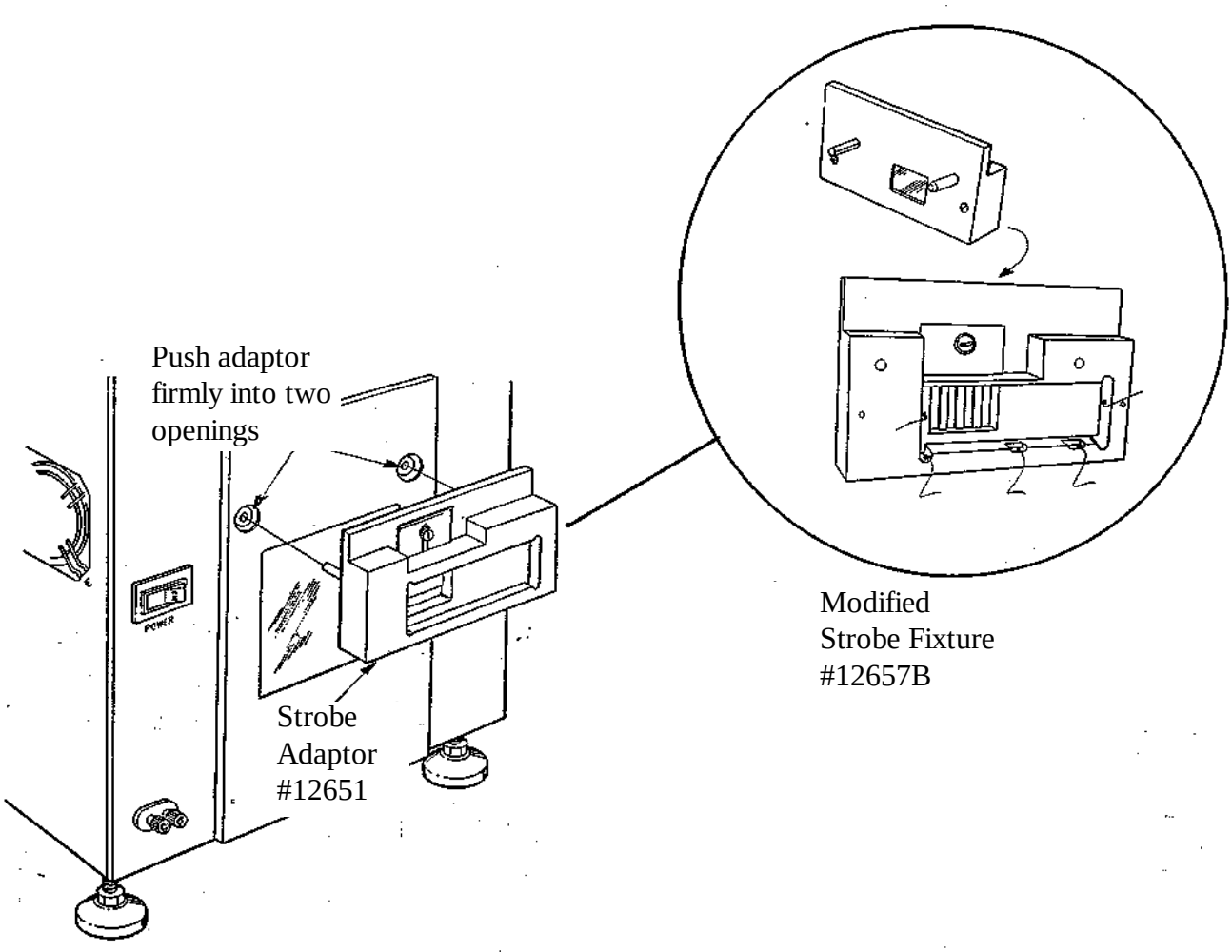

Fig. 2 Installing modified Strobe Fixture 12657B

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3. Erect the electronic flash of the Model 636 and place the camera on the Star Horn #12625.

4. Set the horn with the mounted camera against the tester. Using the leveling legs, raise or lower the tester so that the electronic flash is aligned with and fits into the adapter window (Figure 3).

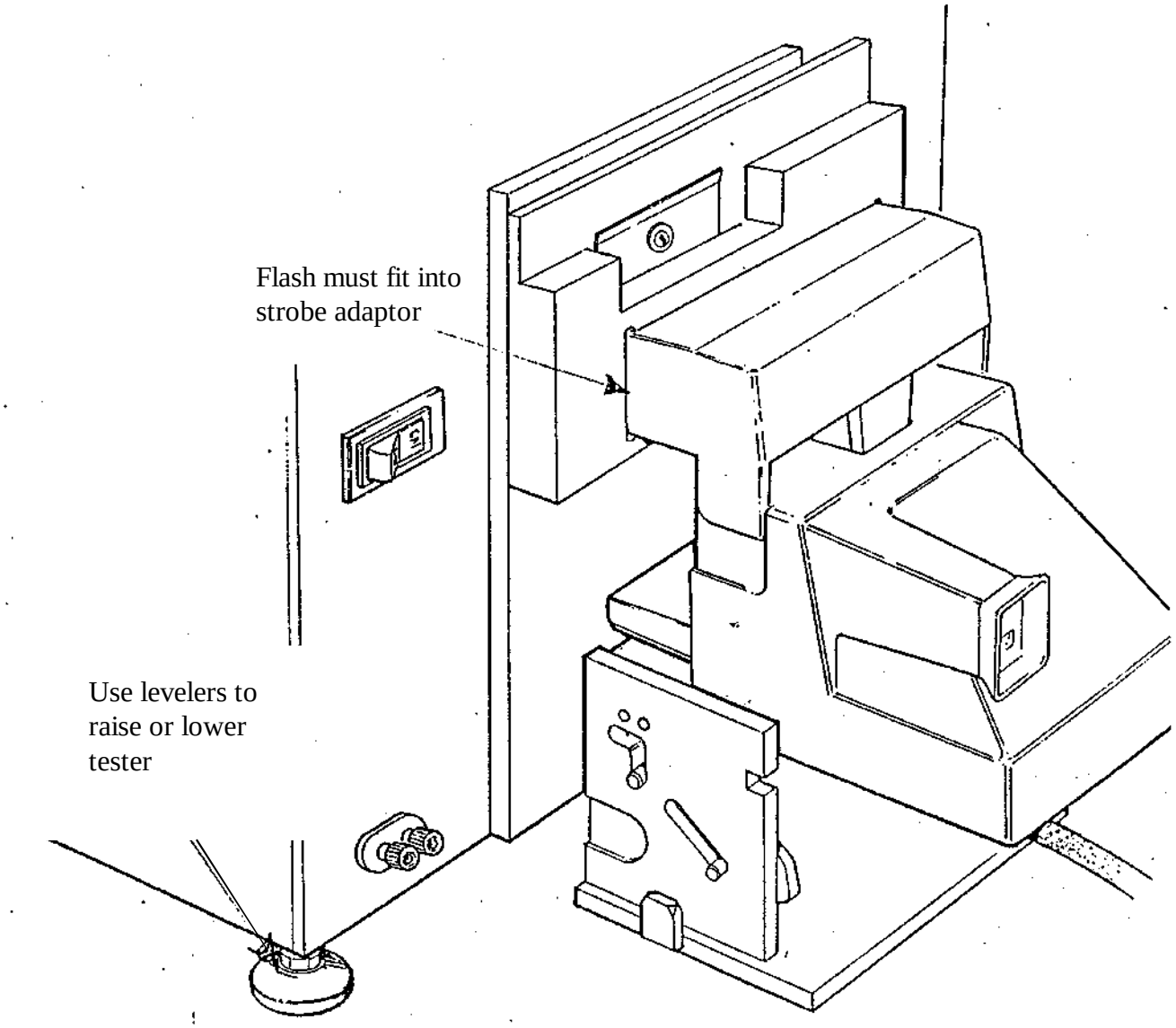

Fig. 3 Aligning Camera on Horn with Tester window

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5. Remove the horn with mounted camera from the proximity of the tester. Carefully, tilt the tester and install two risers #12885 under the leveling legs. Tilt the other side of the tester and install two more risers under the two remaining leveling legs (Figure 4).

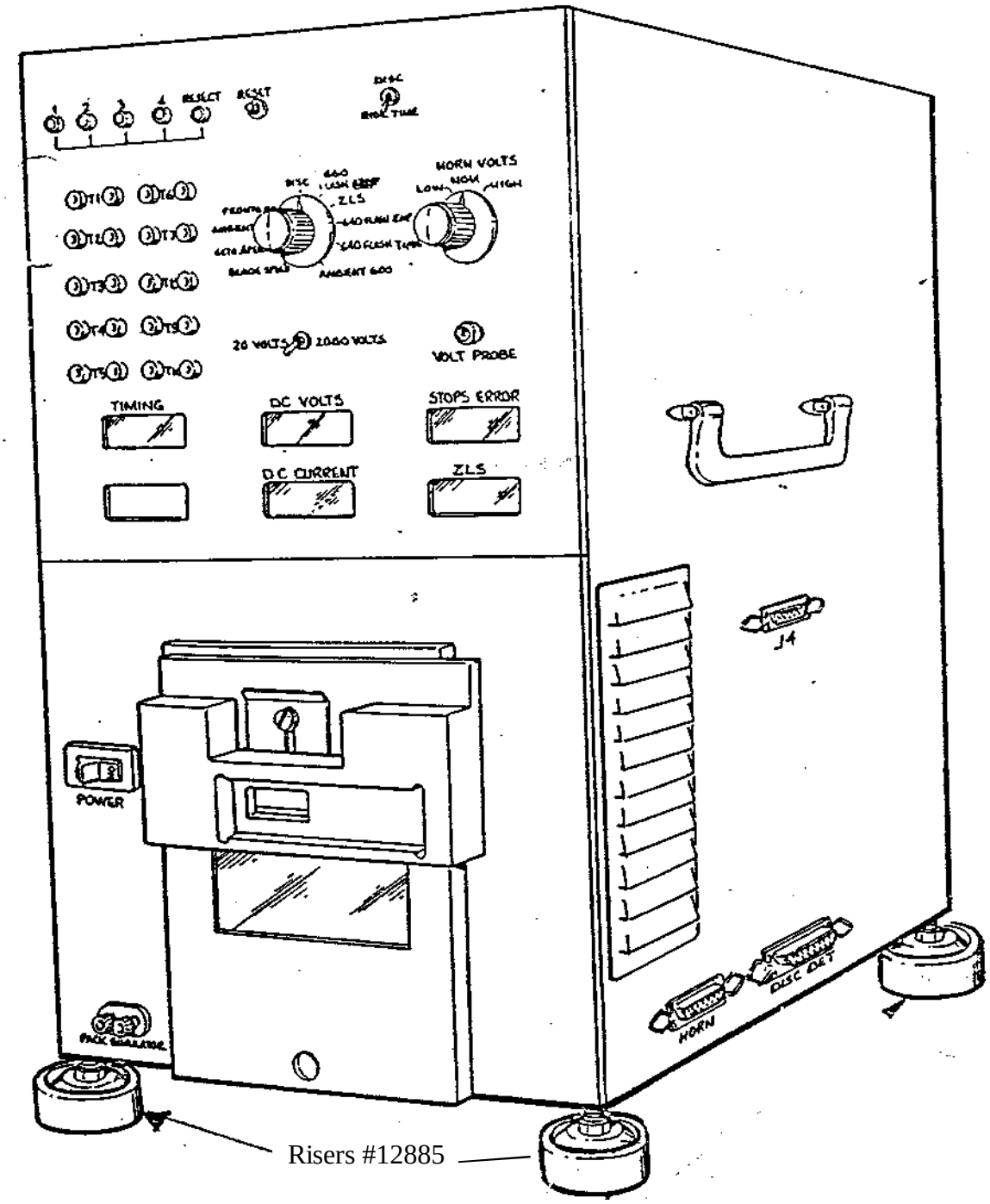

Fig. 4 Installing Risers under Tester's leveling legs

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6. Place horn riser #12884 under the star tester horn (see Fig. 5).

7. Set the horn in the lowered position (Fig. 5).

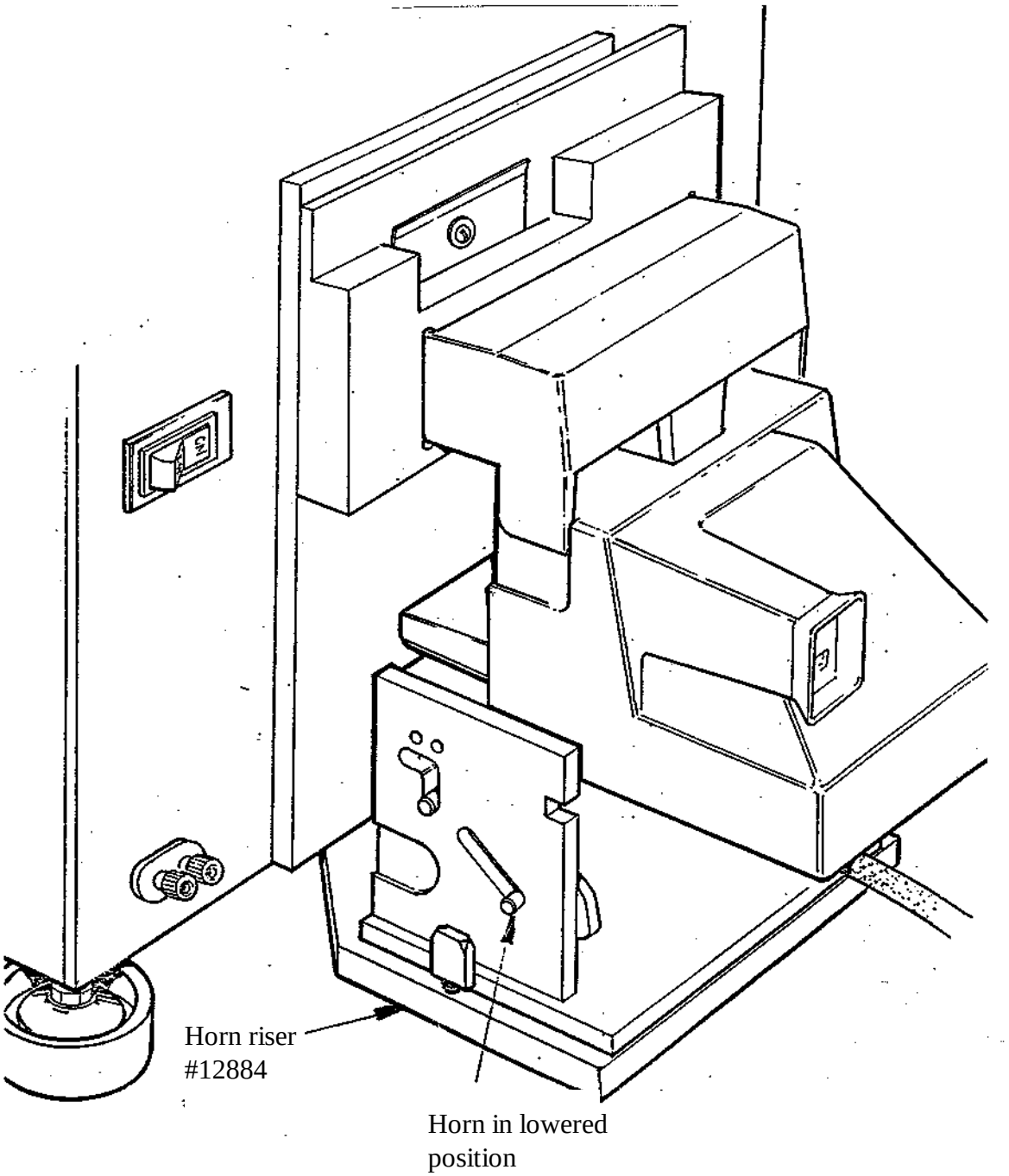

Fig. 5 Test setup and Horn Riser position for Model 636

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D. Star Tester Controls and Indicators

The Star Tester #12650-2 is used to check exposure and timing related parameters of Polaroid cameras. This section deals exclusively with the 636 Polaroid Camera. The light box and the electronics required to compute and display exposure, timing and functional test measurements are housed in a single chassis (see Fig. 6).

Presented below are the functions of the controls and indicators on the Star Tester. Refer to Figure 6.

KEY	CONTROL/INDICATOR	FUNCTION
1	Disc Position Lamps	Not used
2	Reset Button	Clears Tester electronics between tests.
3	Disc/Ride Time Switch	Not used for 636
4	Test Selector Switch	Selects test mode (8 for 600 cameras, 3 for other cameras)
5	Horn Volts Selector Switch	Allows selecting supply voltage of 5V (low), 6V (nom), 6.8V (high). Simulates film pack battery.
6	20 Volt/2000 Volt Selector	Used in conjunction with volt probe jack (key 7) and DC volt meter (key 9); allows Tester to be used as voltmeter.
7	Volt Probe Jack	Accepts standard probe for checking DC voltages in cameras under test.
8	Timing Meter	Provides digital readout of strobe recycle time and flash timing.
9	DC Volts Meter	Provides digital readout of circuit voltages. May also be used with probe in Volt Probe jack (key 7).
10	Stops Error Meter	Provides digital readout of ambient & strobe exposure.
11	DC Current Meter	Provides digital readout of input energy (amp/secs) during flash charge in ZLS mode. May also be used to monitor drain in other test modes.

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KEY	CONTROL/INDICATOR	FUNCTION
12	ZLS Meter	Provides digital readout of flash output.
13	Power Switch	ON/OFF switch for Tester line voltage. Illuminates when ON. Contains circuit breaker.
14	Pack Simulator Jack	Provides a connection for Pack Simulator, allowing Tester to be used as a power supply.
15	Strobe Adapter	Aligns electronic flash of camera under test to Tester. No. 12657B used for 636 Camera
16	Horn Connector	Provides the electronic inter- face for the Star Tester Horn.
17	Disc Detector Connector	Not used with 636.
18	J4 Connector	For future applications.
19	Test Point Connections	Used for electronic interface with oscilloscope and also used for Tester calibration.

CAUTION: When the Star Tester is not being used for a length of time, turn the Test Selector knob to 660 FLASH EXP. This prevents unnecessary wear of the light source bulb and keeps the Tester in a neutral state, ready for the immediate resumption of testing.

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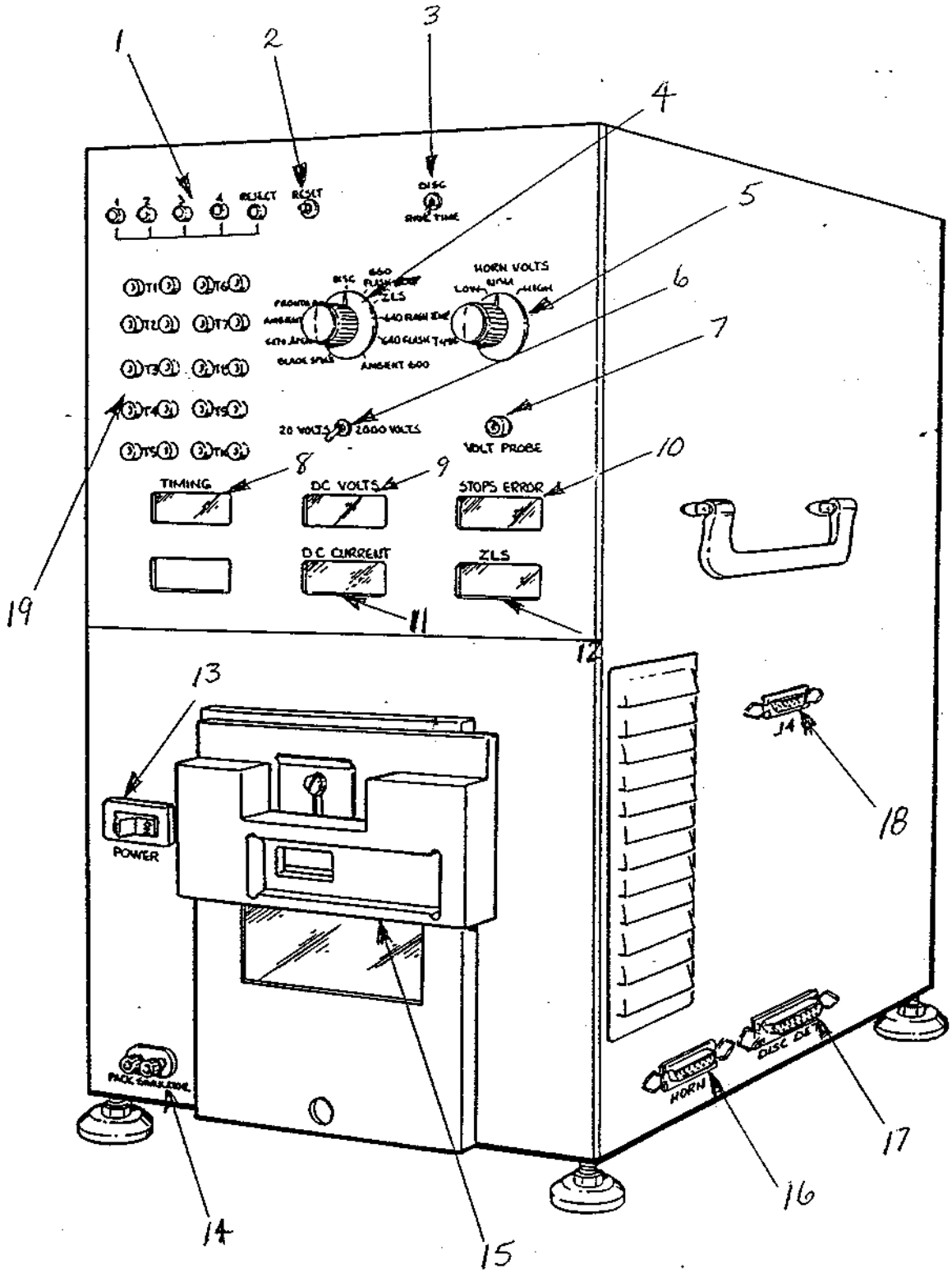

Fig. 6 Star Tester Controls and Indicators

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E. Testing the Model 636 Camera

The procedures which follow are set up with detailed instructions in one column and a summary of the instructions in a second column. Once you have become familiar with the testing procedures, reference to the summary should be all that is necessary to test the cameras.

1. Pre-Test Procedures

Before beginning the testing, check all connections between the Tester and the Star horn, and the oscilloscope (if being used). Check the AC line connections. Clear the area around the Tester to be certain there is sufficient air flow for proper cooling of the electronics. Turn the Tester ON and observe that the power-on lamp is illuminated.

2. Order of Tests

It is very important that the Model 636 Camera tests be done in this order:

1. Flash Timing
2. Ambient Exposure
3. Strobe Exposure (Graywall)
4. ZLS Output *

* Not necessary if Strobe Exposure is correct.

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3. Model 636 Camera Test Procedures (in the order in which they should be performed).

Model 636 Flash Timing This test determines if the proper infrared sensing is accomplished during a strobe exposure. The time between shutter blades being 95% fully open and strobe fire is measured and displayed in milliseconds.

NOTE: This procedure assumes the Tester is ON and the Camera is on the horn, against the Tester.

DETAILED TEST PROCEDURE	SUMMARY
1. Turn the Selector Knob in the middle of the panel to 640 FLASH TIMING.	1. Selector to 640 Flash Timing.
2. Press the S10 button only to charge the electronic flash. Do not fire the flash.	2. Press S10 to charge flash.
3. Press the tester RESET button.	3. Press Reset.
4. Cover the photocell and press S1 to make an ambient exposure. Ignore the readings.	4. Cover cell, press S1 for ambient exposure. Ignore readings.
5. Cover the photocell and press Sl/S10 to take a flash exposure. Record the reading shown on the Timing meter and compare it to the specification.	5. Cover cell, press S1/S10 for flash exposure. Record reading on Timing Meter. Compare to spec.
6. Repeat steps 2, 3, 4 and 5 two more times to insure accurate readings.	6. Repeat 2, 3, 4 & 5 two more times
7. If the readings are not within the specifications, refer to the **Adjustments** section.	7. If readings are out-of-spec, see **Adjustments**

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Model 636 Ambient Exposure This test measures the energy on the film plane during an ambient exposure. The Tester provides a constant 100 candles/square foot scene brightness.

NOTE: The following procedure assumes the Tester is on and the camera is installed on the horn in front of the Tester light source.

DETAILED TEST PROCEDURE

1. Turn the Selector Knob in the middle of the panel to Ambient 600. (Be certain the close-up lens is not in position.)
2. With the photocell uncovered, press S1 only to take an ambient exposure.
3. When the exposure is made, record the reading shown on the Stops Error meter. Compare the reading to the specification.
4. Repeat steps 2 & 3 two more times to insure accurate readings.
5. If the reading is not in specification, refer to the **Adjustments** section.

SUMMARY

1. Selector to Ambient 600. (No close-up lens setting.)
2. Cell uncovered, press S1 for ambient exposure.
3. Record reading on Stops Error meter. Compare to spec.
4. Repeat 2 & 3 two more times.
5. If reading is out-of-spec, see **Adjustments.**

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Model 636 Strobe Exposure (Graywall)

This test measures the resultant energy on the film plane during a 4.5 ft. (137 cm) graywall exposure.

NOTE: Be certain the L/D control on the Camera is at the mid-point setting.

DETAILED TEST PROCEDURE

1. Turn the Selector Knob in the middle of the panel to 640 Flash Exp.
2. Install the camera on the horn with the taking lens 4.5 ft. (137 cm) from a graywall target. (See Figure 7).
3. With the photocell uncovered, press Sl/S10 to take a flash exposure.
4. When the flash fires, record the readout shown on the Stops Error meter. Compare the reading to the specification.
5. Repeat steps 3 and 4 two more times to insure accurate readings.
6. If the reading is not within specification, refer to the **Adjustment** section.

SUMMARY

1. Selector to 640 Flash Exposure.
2. Camera on horn 4.5 ft. (137 cm) from graywall.
3. Cell uncovered, press S1/S10 for flash exposure.
4. Record reading on Stops Error Meter. Compare to spec.
5. Repeat 3 & 4 two more times.
6. If reading out-of-spec, see **Adjustments.**

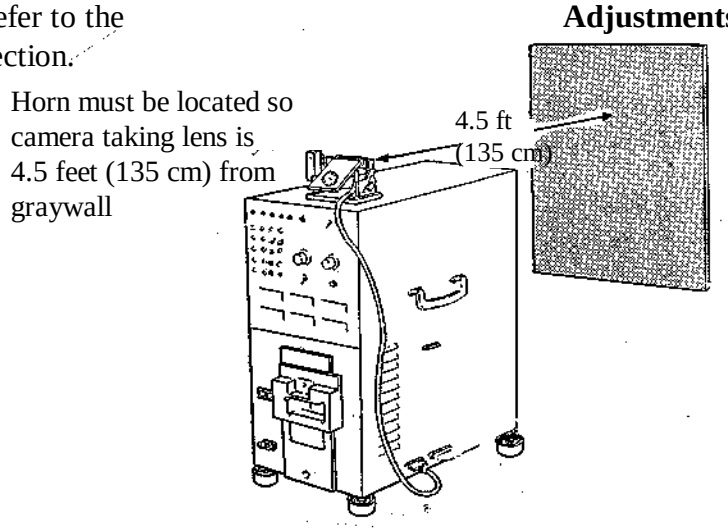

Fig. 7 Setup for 636 Graywall Test

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Model 636 Zonal Lumen Seconds (ZLS) Output This test measures the output of the strobe in a standard integrating sphere located within the Tester. The light output measurement is integrated over the duration of the flash and the measurement is displayed as correlated zonal lumen seconds on a meter on the Tester.

NOTE: This test is not necesssary if Strobe Exposure Test is within spec.

DETAILED TEST PROCEDURE

1. Turn the Test Selector Switch located in the middle of the panel to ZLS. (Be sure the closeup lens is not in place.
2. Erect the flash and open the camera door. Install door pawl closure #12082.
3. Install the camera on the Star horn. Align the camera so the flash fits into strobe adapter #12657B on the tester. (To assure repeatable readings, the flash must be fully seated in the adapter and pushed against the left wall with the front of the apron firmly against the light box.
4. Press the Reset Button.
5. Cover the photocell on the camera and press Sl/S10 fully to charge and fire the flash.
6. When the flash fires, observe the reading on the ZLS meter. Record the reading and compare it to the specification. NOTE: In this test,l in addition to ZLS, you can also observe strobe recycle time on the Timing meter and amp/seconds on the DC Current meter.
7. Repeat Steps 4, 5 and 6 two more times to insure accurate readings.
8. If ZLS, Recycle Time or Amp Seconds are not within specification, replace the strobe.

SUMMARY

1. Selector to ZLS. (No close-up lens.)
2. Erect flash, open door, install door pawl closure.
3. Install camera on horn. Align to Tester.
4. Press Reset.
5. Cover photocell, press S1/S10 to fire flash.
6. Record reading on ZLS meter. Also check recycle time and current drain. Compare readings to spec.
7. Repeat 4, 5 & 6 two more times.
8. If readings are out-of-spec, replace strobe.

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F. Camera Adjustments (correcting out-of-spec test results)

This section describes adjustments which can be made to correct readings which are out-of-specification on the Star Tester #12650-2.

Refer to the Specification Chart to determine acceptable readings for each of the tests listed below.

1. Flash Timing

a. Remove the Front Plate/Lens Panel from the apron (Fig. 8).

b. Using tweezers, grasp the end of the opening blade spring.

c. Move the opening blade spring up in the rack to increase the reading or down in the rack to decrease the reading (Fig. 9).

d. Reassemble and retest the camera. Readjust the opening blade spring if necessary. If the adjustment cannot bring the reading into specification, replace the opening blade spring and repeat step 3.

e. If the reading is still out-of-specification, disassemble the camera to the shutter level. Examine the shutter area for loose or misplaced parts, binding blades, etc. Correct any problems found and reassemble and retest the camera. Readjust the opening blade spring if necessary.

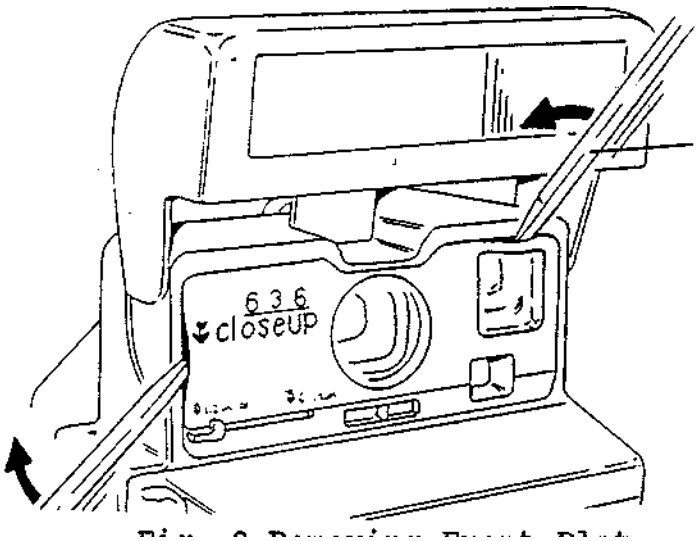

Fig. 8 Removing Front Plate

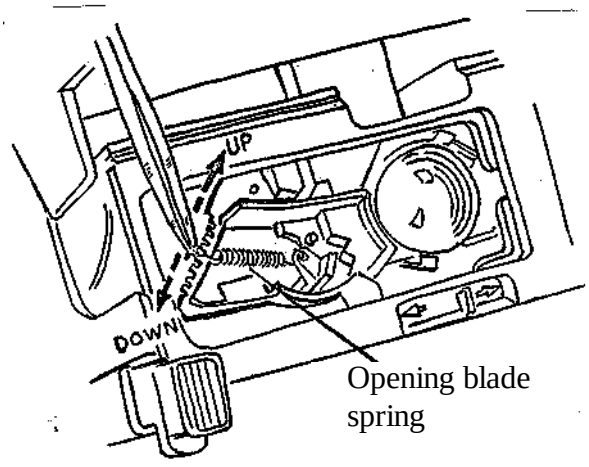

Fig. 9 Adjusting Blade Spring

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2. Ambient Exposure

a. With the Camera off the Tester, remove the Front Plate/Lens Panel and replace it with a modified Front Plate as shown in Fig. 10. (See NPI 600AM #92-30 for more information.)

b. Using a dental pick, narrow-bladed screwdriver or other suitable tool, adjust the ambient calibration disc. Move the ambient calibration disc clockwise (CW) to decrease the reading or counterclockwise (CCW) to increase the reading (Fig. 11).

c. Replace the original Front Plate and retest the camera. Readjust the ambient calibration disc if necessary.

d. If the ambient calibration disc adjustment cannot bring the reading into specification, disassemble the camera down to the shutter level and examine the photocell area. Be certain the photocell is properly seated. Reassemble the camera and retest. Readjust the ambient calibration disc if necessary.

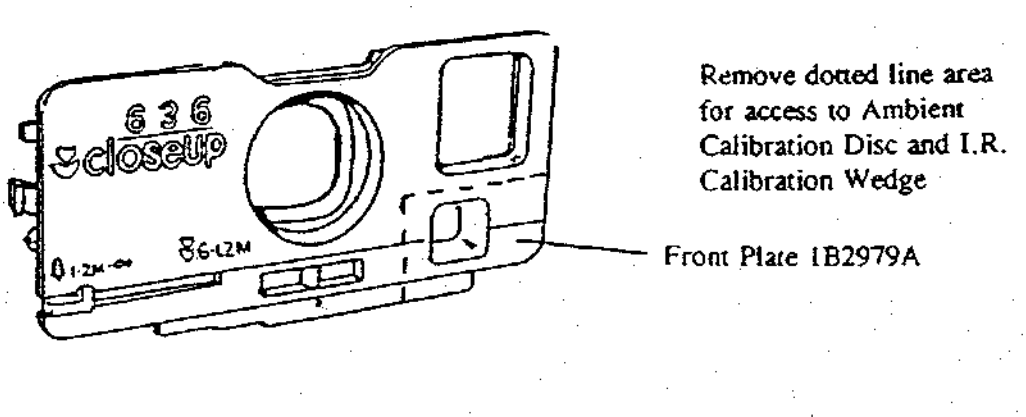
636
closeup
Remove dotted line area for access to Ambient Calibration Disc and I.R. Calibration Wedge
Front Plate 1B2979A

Fig. 10 Replacing Front Plate with modified Front Plate

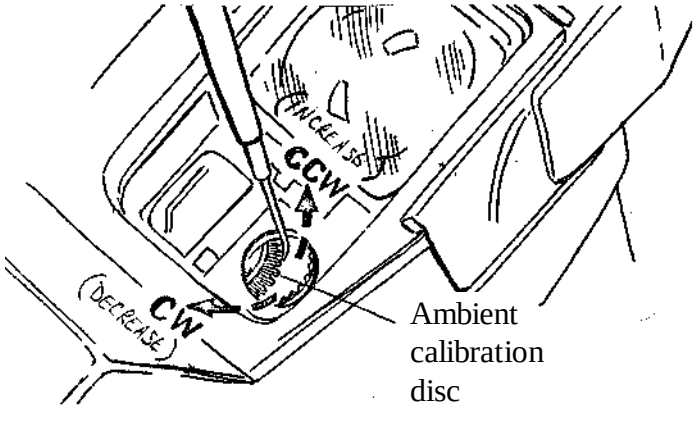

Fig. 11 Adjusting Ambient Calibration Disc

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3. Strobe Exposure (Graywall)

NOTE: If the Strobe Exposure readings are out of spec, perform the ZLS Output test before making the adjustment below. If ZLS reading is out, replace the strobe

a. With the Camera off the Tester, remove the Front Plate/Lens Panel and replace it with a modified Front Plate as shown in Fig. 10. (See NPI 600AM #92-30 for more information.)

b. Using a dental pick, narrow-bladed screwdriver or other suitable tool, adjust the IR calibration wedge. Move the IR calibration wedge counterclockwise (CCW) to decrease the reading or clockwise (CW) to increase the reading (Fig. 12).

c. Replace the original Front Plate and retest the camera. Readjust the IR calibration wedge if necessary.

d. If the IR calibration wedge adjustment cannot bring the reading into specification, disassemble the camera down to the shutter level and examine the photocell area. Be certain the photocell is properly seated. Reassemble the camera and retest. Readjust the IR calibration wedge if necessary.

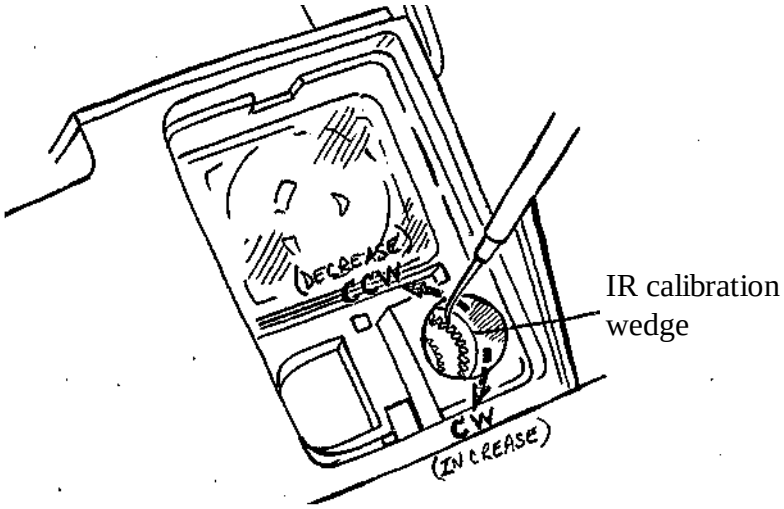

Fig. 12 Adjusting IR Calibration Wedge

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G. Calibrating the Model 12650-2 Star Tester

This procedure is a guide for a periodic calibration check of the Star Tester. The details of actual adjustments are included in a separate document. All readings should be within ±0.03 stops or 3% of the specification. Any re-calibration must be done in the order shown. See your calibrator box specification sheet for actual readings.

Allow a minimum of 10 minutes of "warm-up" time before checking calibration.

NOTE: * = Applicable to Model 636 Camera

SUMMARY

Star Tester Setting	Cal. Box Setting	Manual Reset Necessary?	Adjustment Point
* 1. 640 FL.EXP.	B-STR-Pulse	No	Card 1 R4
* 2. ZLS	(Use Std.Camera)	No	Card 1 R6
* 3. Ambient 600	B-AMB-Pulse	No	Card 1 R5
4. 660 FL.EXP.	B-STR-Pulse	No	Card 2 R1
5. 610/620 FL.EXP.	C-AMB-Pulse	No	Card 2 R3
6. SX-70 Aper.	D-AMB-Pulse	Yes	Card 2 R4
7. Ambient 150	C-AMB-Pulse	No	Card 2 R2
8. Pronto! 3' Aper.	E-AMB-Pulse	Yes	Card 2 R5
* 9. ZLS (Amp-Sec)	A-AMB-Pulse	Yes	Card 3 R32
10. ZLS (Recycle Time)	A-AMB-Pulse	Yes	Card 3 R25
*11. Ambient 600	(Light level STD-Adjust for 100 cd/sq ft)		Via access hole in rear panel of Tester

For steps 1 and 3 thru 10, connect the calibrator box to the Star Tester horn connector J1. Set the cal. box as indicated, press" Reset" on the Star Tester, then press "Cycle" on the cal. box. Note the appropriate readout on the Star Tester. Repeat when the "Busy" light is not lit.

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SECTION 7 — 636 CAMERA TESTING WITH THE B-600 TESTER

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A. B-600 Tester functions, controls & indicators

The B-600 testing system is used to check exposure and timing-related parameters on 600 line cameras. The electronics unit (Fig. 1) houses the circuits needed to set the parameters and to display test results. The Model B light source provides the light levels required for ambient exposure measurements.

The chart below shows the function of each of the controls and indicators on the electronics unit. Following the chart are the pretest and test procedures. Note that the test procedures are set up with detailed instructions in the left column and a summary in the right column. Once you have become familiar with the test procedures, occasional reference to the summary should be all that is necessary to properly test 636 cameras.

KEY	CONTROL/INDICATOR	FUNCTION
1	Power Switch	ON/OFF Switch: provides line voltage to Tester A built-in lamp lights when the switch is ON.
2	Camera Current Meter	Provides readout of camera DC current during a camera cycle.
3	Test Selector Switch	Used to select the various test modes.
4	Stops Error Meter	Provides digital readout of test results. (Reading is in stops error.)
5	Normal/Midcycle Switch	Provides for a complete cycle or midcycle of a camera on the horn.
6	Horn Connector	Provides the electronic interface between the B-600 horn and the electronics unit.
7	BB Error LED	Provides a visual check of blade bounce error in Model 610/620 cameras.
8	Strobe Detector/	Provides electronic interface between Strobe/ Flash Detector connector Flash Detectors and the electronics unit.
9	Calibrate/Test Switch	Sets the electronics unit either for normal testing of 600 line cameras or for calibration of the electronics in conjunction with a special calibration test box.
10	Manual Reset Button	Used to clear the electronics when a camera is installed on the horn.
11	Mode Switch	Used to select exposure or aperture test mode.
12	Pack Simulator Connection	Provides connection for power paddles, allowing the tester to be used like a power supply.
13	Horn/Pack Simulator Switch	Allows switching of electronics for testing cameras on horn or with separate power paddle.

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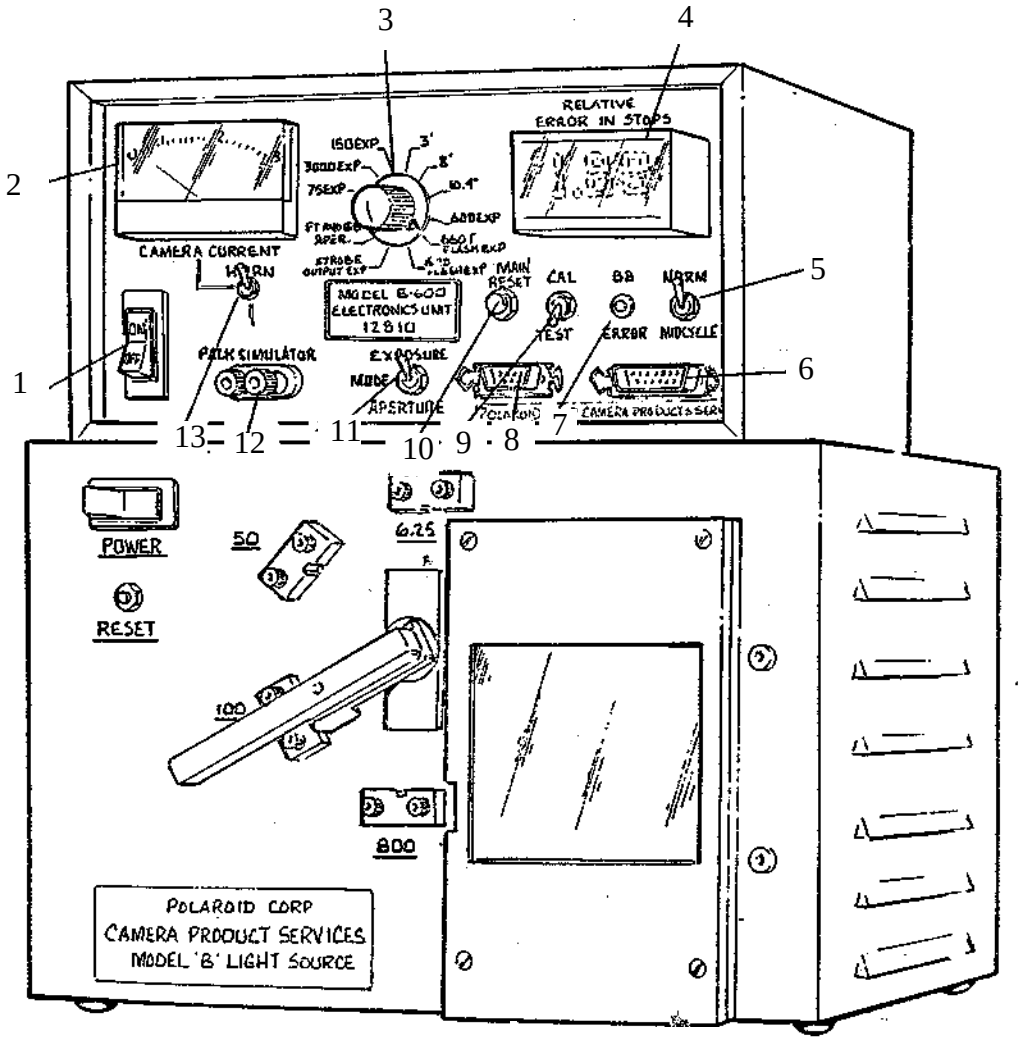

Fig. 1 Model B-600 Tester and Model B Light Source

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B. Model 636 Camera Testing

1. 636 Camera Test Specifications

Test	Specification
Flash Timing Aperture	-.02 to +.07
Flash Exposure	-.15 to -.55
Ambient Exposure	+.10 to -.30

2. Pretest Procedures

Before performing any of the tests below, examine the B-600 testing system. Check the electrical connections between the electronic unit, the light source and the horn to be sure they are properly made. Turn the electronics unit and the light source ON and observe that the Power-On lamps light. On a regular basis, check the equipment to be sure nothing blocks the exhaust vents on the light source.

All of the testing procedures below assume that the test equipment is ON and is in good working order.

In the procedures which follow, whenever reference is made to a particular control or indicator, you may assume that the location is on the B-600 Electronics Unit. If it is not, the procedure will indicate where the control or indicator is located. Also, unless otherwise indicated, the Horn/Pack Simulator switch should be at HORN; the CAL/Test switch should be at TEST; the Norm/Midcycle switch should be at NORM.

One other word. You must remember that every time you install the camera on the horn, you must press the MANUAL **RESET** button on the electronics unit to be certain that the electronic circuitry is cleared for the particular test you are doing. This applies even in the middle of a procedure where the camera must be removed from the horn and then re-installed. **REMEMBER - PRESS THE MANUAL RESET BUTTON WHEN YOU PLACE THE CAMERA ON THE HORN!**

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3. Test Procedures:

Model 636 Flash Timing Aperture The purpose of this test is to measure blade aperture at the point of flash fire.

DETAILED PROCEDURE

1. Turn the test selector switch to Ft and BB APERTURE.
2. Flip the MODE switch to APERTURE.
3. Plug the strobe/flash detector fixture #12790 into the B-600 jack as shown in Figure 2. Install the strobe detector clip over the camera strobe.
4. Set the light source selector to 100 cd/sq ft.
5. Install the door pawl closure #12082 in the camera and set the camera on the horn. (RESET) Align the camera in front of the light source.
6. Cover the camera photocell with finger and press S10/S1 until strobe fires.
7. When strobe fires, record reading shown on Relative Error in Stops meter. Compare the reading to the specification.
8. Repeat steps 6 and 7 two more times to insure accurate reading.
9. If reading is not within specification, refer to **Adjustments.**

SUMMARY

1. Selector to FT and BB APERTURE.
2. Mode switch to APERTURE.
3. Plug in strobe/flash detector. Install detector clip on camera.
4. Light source to 100 cd/sq. ft.
5. Install door pawl closure. Set camera on horn in front of light source.
6. Cover photocell, fire strobe.
7. Compare reading to spec.
8. Repeat steps 6 & 7 twice
9. If out of spec, see **Adjustments.**

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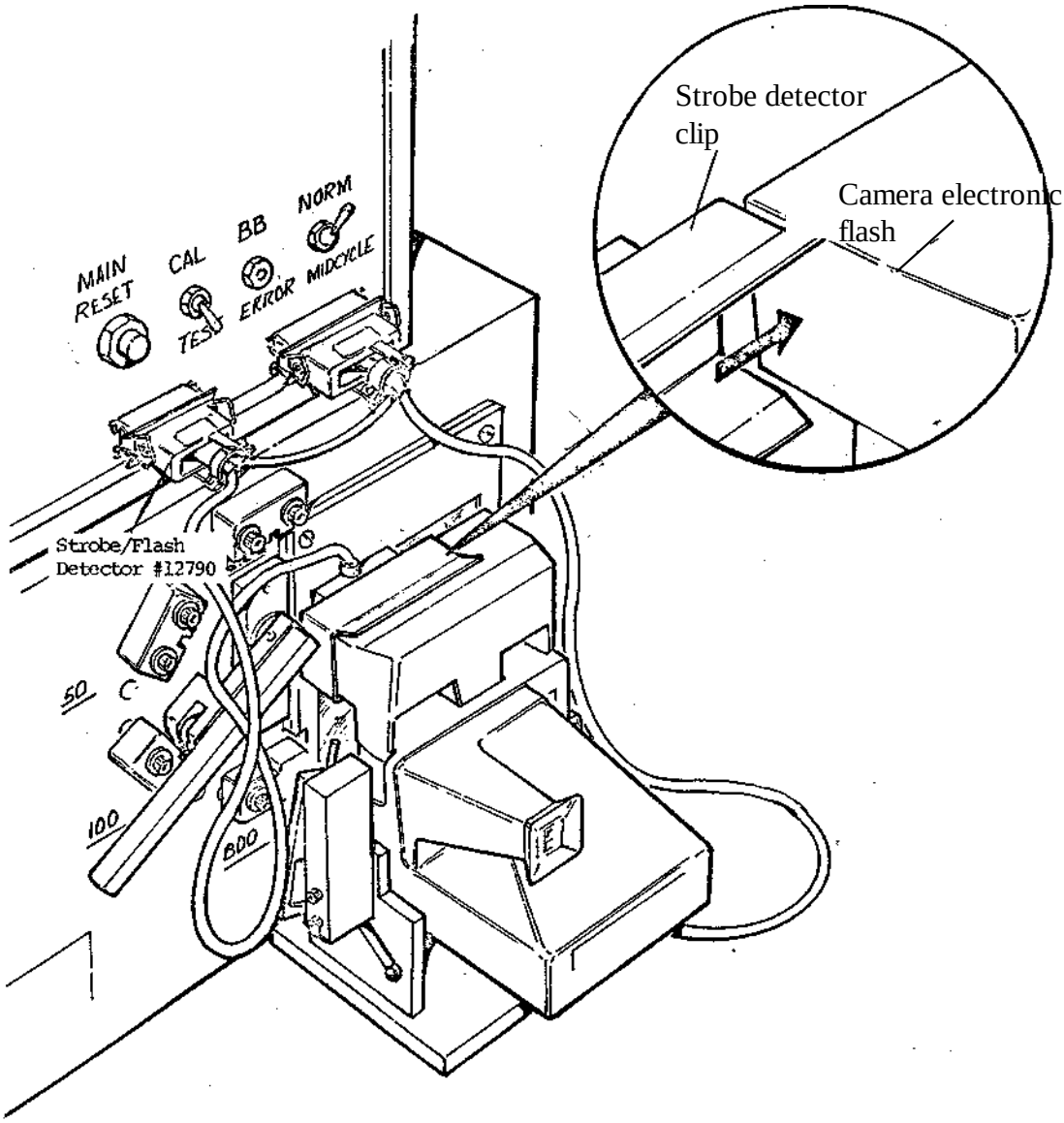

Fig. 2 Camera on Horn, ready for testing

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Model 636 Flash Exposure This test measures the resultant energy on the film plane during a flash exposure equivalent to a 4.5 ft graywall exposure.

NOTE: The following procedure assumes the camera is on the horn.

DETAILED PROCEDURE

1. Set the camera L/D control to its mid-point setting.
2. Turn the test selector switch to 640 FLASH EXPOSURE
3. Flip the mode switch to EXPOSURE.
4. Orient the camera on the horn so it is exactly 4.5 ft from a graywall.
5. With photocell uncovered, press S10/S1 to take a flash exposure.
6. When strobe fires, record reading shown on Relative Error in Stops meter Compare reading to the specification.
7. Repeat steps 5 and 6 two more times to insure accurate reading.
8. If reading is not within specification, refer to **Adjustments.**

SUMMARY

1. Camera L/D to mid-point
2. Selector to 640 FLASH EXPOSURE.
3. Mode switch to EXPOSURE
4. Camera 4.5 ft from graywall
5. Take flash exposure.
6. Compare reading to spec.
7. Repeat 5 & 6 twice
8. If out of spec, see **Adjustments.**

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Model 636 Ambient Exposure This test measure the energy on the film plane during an ambient exposure at 100 cd/sq ft scene brightness.

NOTE: The following test assumes the camera is on the horn, against the light source.

DETAILED PROCEDURE

1. Turn the test selector switch to 600 EXPOSURE.
2. Flip mode switch to EXPOSURE.
3. Set the light source selector
4. With the photocell uncovered, press S1 only.
5. When exposure is made, record the reading shown on the Relative Error in Stops meter. Compare reading to specification.
6. Repeat steps 4 and 5 two more times to insure accurate reading.
7. If the reading is not within specification, refer to **Adjustments.**

SUMMARY

1. Selector to 600 EXPOSURE
2. Mode switch to EXPOSURE
3. Light source to 100 cd/sf to 100 cd/sq ft
4. Press S1
5. Compare reading to spec.
6. Repeat 4 & 5 twice.
7. If out of spec, see **Adjustments.**

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C. Model 636 Camera Adjustments (to correct out-of-spec test results)

This section describes adjustments which can be made to correct readings which are out-of-specification on the B-600 Tester. Refer to the latest Specification Chart to determine acceptable readings for each of the tests listed below.

The Camera Adjustments which follow are listed in the same order as the Test Procedures:

Flash Timing Aperture

Flash Exposure

Ambient Exposure

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1. Model 636 Flash Timing Aperture Adjustment

a. Remove the Front Plate/Lens Panel from the apron (Fig. 3).

b. Using tweezers, grasp the end of the opening blade spring.

c. Move the opening blade spring up in the rack to increase the reading or down in the rack to decrease the reading (Fig. 4).

d. Reassemble and retest the camera. Readjust the opening blade spring if necessary.

e. If the adjustment cannot bring the reading into specification, replace the opening blade spring and repeat step c.

f. If the reading is still out-of-specification,disassemble the camera to the shutter level. Examine the shutter area for loose or misplaced parts, binding blades, etc. Correct any problems found and reassemble and retest thecamera. Readjust the opening blade spring if necessary.

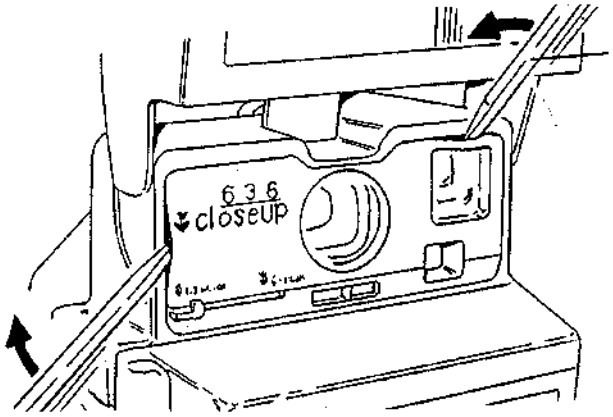

Fig. 3 Removing Front Plate/Lens Panel

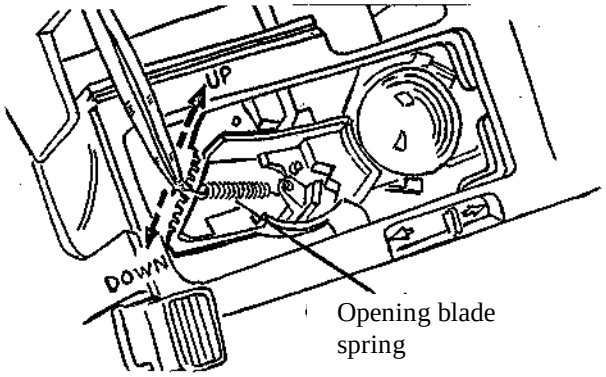

Fig. 4 Adjusting Opening Blade Spring

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2. Model 636 Flash Exposure Adjustment

a. Remove the Front Plate/Lens Panel (see Fig. 3) and replace it with the modified Front Plate shown in Fig. 5 (NPI 600AM #92-30 has more information).

b. Using a dental pick, narrow-bladed screwdriver or other suitable tool, adjust the IR calibration wedge (see Fig. 6). Move the IR calibration wedge counterclockwise (CCW) to decrease the reading or clockwise (CW) to increase the reading (see Fig. 6).

c. Replace the original Front Plate and retest the camera. Readjust the IR calibration wedge if necessary.

d. If the IR calibration wedge adjustment cannot bring the reading into specification, disassemble the camera down to the shutter level and examine the photocell area. Be certain the photocell is properly seated. Reassemble the camera and retest. Readjust the IR calibration wedge if necessary.

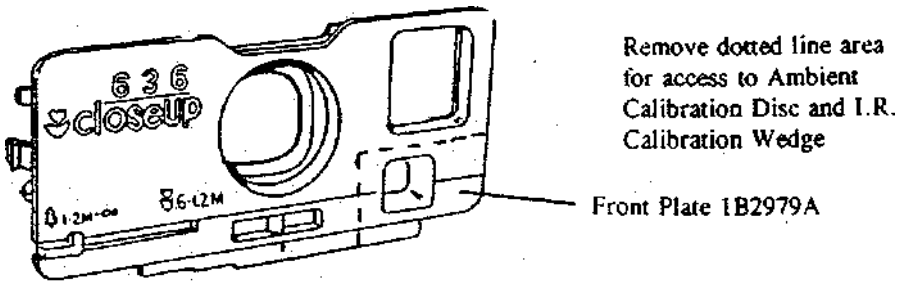
636
closeup
Remove dotted line area for access to Ambient Calibration Disc and I.R. Calibration Wedge
Front Plate 1B2979A

Fig. 5 Replacing Front Plate with modified Front Plate

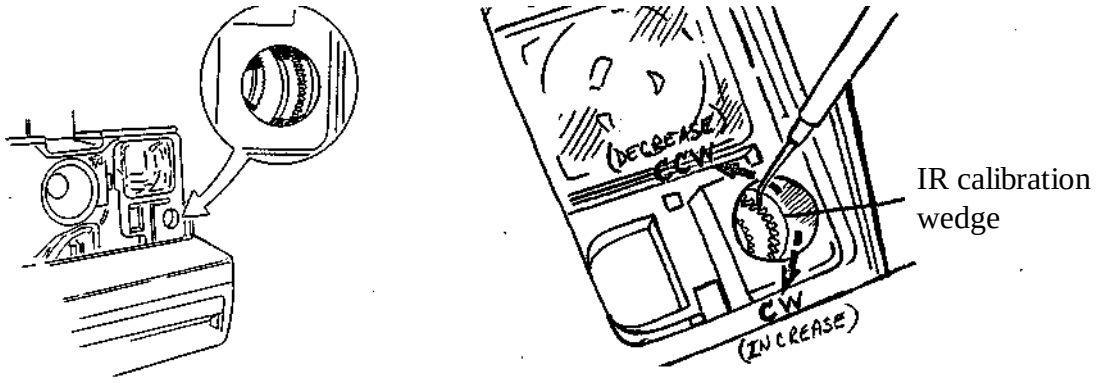

Fig. 6 Adjusting IR Calibration Wedge

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3. Model 636 Ambient Exposure Adjustment

a. Remove the Front Plate/Lens Panel (see Fig. 3) and replace it with the modified Front Plate shown in Fig. 5 (NPI 600AM #92-30 has more information).

b. Using a dental pick, narrow-bladed screwdriver or other suitable tool, adjust the ambient calibration disc (see Fig. 7). Move the ambient calibration disc clockwise (CW) to decrease the reading or counterclockwise (CCW) to increase the reading (see Fig. 7).

c. Replace the original Front Plate and retest the camera. Readjust the ambient calibration disc if necessary.

d. If the ambient calibration disc adjustment cannot bring the reading into specification, disassemble the camera down to the shutter level and examine the photocell area. Be certain the photocell is properly seated. Reassemble the camera and retest. Readjust the ambient calibration disc if necessary.

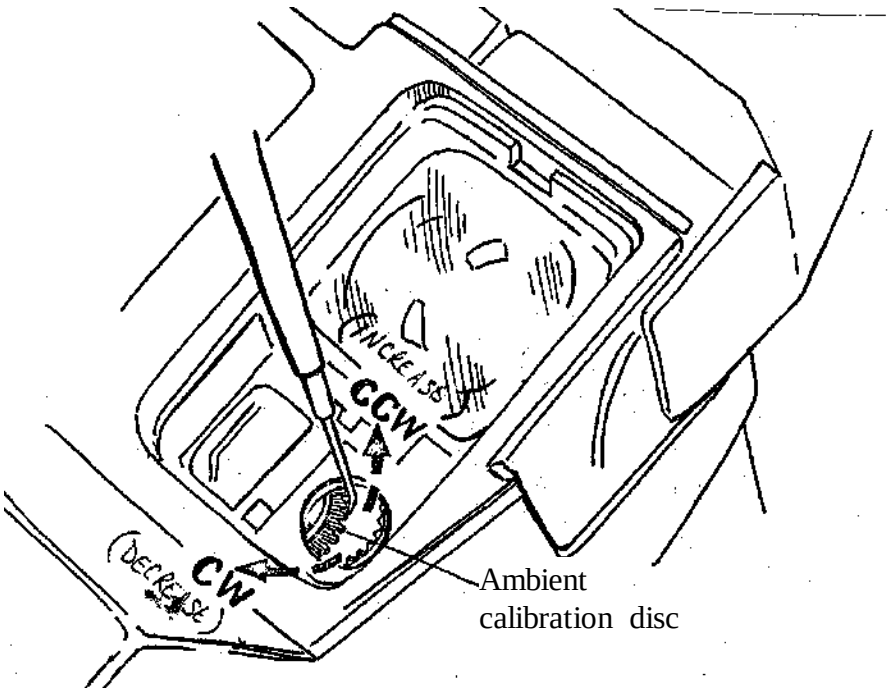

Fig. 7 Adjusting the Ambient Calibration Disc

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D. Calibrating the B-600 Tester

Calibration of the B-600 Tester is done in three steps:
(1) calibrating the Light Source,
(2) the Horn and
(3) the Electronics Unit.

While the probability of the B-600 going out of calibration is unlikely, the B-600 should be checked daily.

Calibrating the B-600 Light Source

Light Source calibration is done using a 640 Master Camera, which measures light levels in both the visible and infrared regions.

Two switches are located on the top of the Camera: Motor ON/OFF prevents the Camera from cycling while it is used as a light level standard, and Meter ON/OFF controls the meter on the back of the Camera. A slide on the front of the Camera, next to the lens, controls the blade opening.

Calibration procedure:

1. Turn ON the light source and let it warm up for 30 minutes.

2. Slide the Master Camera on the horn with the motor switch OFF and the meter switch ON.

3. Place the Master Camera in front of the Light Source window. Set the light level for 100 cd/sq. ft.

4. Slide the blade control all the way to the left (as viewed from the back of the Camera) until you hear a click. This signals the blades have unlatched.

5. Slide the blade control all the way to the right: this is the blade position at which the standard camera is indicating the visible light level. Since the standard camera is a direct reading device, the meter reading is the actual light level.

6. Tilt the camera and the horn back so that the shutter blades can be seen through the taking lens.

7. Slide the blade control to the left until the shutter is at full aperture: this is the point at which the camera will indicate the IR light level.

8. Place the camera back in front of the Light Source: the meter reading should be 3.5 to 4 times the visible mode reading. (Ideally, the visible reading should be 100 and the IR reading 350 to 400.)

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9. If this is not the case, the light level must be adjusted. Remember that adjusting the light level also affects the visible/IR ratio. Also, increasing the lamp voltage causes the IR level to drop.

10. When the 100 cd/sq ft level is correct and the ratio acceptable, calibrate the remaining light levels as follows: slide the blade control all the way to the right and adjust the corresponding detent block on the front of the Light Source. Ignore the visible/IR ratio for the 800, 50 and 6.25 cd/sq ft positions.

Calibrating the Horn

This procedure involves measuring offset and gain.

1. Insert the Horn Extender Plug into the Horn Connector on the B-600 Electronics Unit front panel. Plug the Horn into the Extender Plug.

2. Connect a DVM across pins 9 and 14 of the Extender Plug (the two on the far right, one above the other).

3. Slide the Master Camera on the Horn with the shutter blades closed. The DVM should read less than 1 mv (0.001 volt).

4. If not, adjust the offset: insert a screwdriver in the hole on the right side of the Horn, toward the front of the Camera. Adjust the Offset control until the reading is less than 1 mv.

5. Open the shutter blades until they are at full aperture. Place the Horn and the Standard Camera in front of the Light Source set at 100 cd/sq ft.

6. The DVM reading should correspond to the number marked on the Master Camera.

7. If not, insert a screwdriver in the hole on the left side of the Horn, toward the front of the Camera. Adjust the Gain control until the voltage is correct.

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Calibrating the Electronics Unit

1. Plug the calibrator into the Horn Connector.

2. Set the CAL/TEST Switch to CAL.

3. Set the two switches on the Calibrator in the AMB and CONT positions.

4. Starting with the 75 exp. range, set the Range Switch on the Electronics Unit and the rotary switch on the Calibrator to the positions shown on the label on the rear of the Calibrator. Do this for all ranges except Flash Timing.

5. For Flash Timing, set the Range and rotary switches to the proper positions.

6. Set the CAL/TEST switch to TEST.

7. Insert a fresh film pack with battery into the Master Camera.

8. Place the Strobe Detector over the strobe and charge the strobe by pressing the red Strobe Charge button.

9. Fire the strobe by pressing the flash button: the reading in stops error should correspond to the reading marked on the Calibrator label.

Checking Graywall Reflectance

1. With the Master Camera on the Horn, set the Motor Switch to OFF and the shutter blades at full travel.

2. Set the Electronics Unit to 640 FLASH EXP.

3. Place the Horn with the Master Camera 4.5 ft. (137 cm) from the graywall.

4. Charge the strobe and fire it with the flash button on the front of the strobe.

5. The reading on the STOPS ERROR Meter should correspond to the reading on the Master Camera.

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